

north end, and is about 800 yards wide at its narrowest part. The easternmost is obstructed at its northern end by a barrier reef near the 100-fathom curve. This reef can be made out by the discoloration of the water and the usually heavy breakers.

4-109 GORONG ISLANDS, $22\frac{1}{2}$ to 38 miles east-southeast of the southeastern point of Ceram, consist of Pandjang, Manawoka, and Gorong. They are hilly and heavily wooded. The first two are connected by a bank of soundings of less than 100 fathoms, but a deep-sea passage separates these two from Gorong. There are no detached dangers far beyond the fringing reef, except on both sides of the northern part of Gorong where they extend up to 1 mile off. Valuable woods are cultivated on all of the islands. Proas are built. The principal sources of revenue of the inhabitants are the coconut and sago plantations and the fisheries.

Tidal currents have been observed to set northward with a rising tide and southward with a falling tide. Southward of Manawoka the latter current draws to the south-southwestward, so that it sets across the strait between the Gorong and Watoebela Islands. At full moon, it may attain a velocity of $2\frac{1}{2}$ knots. Strong tide rips occur in places.

4-110 Pandjang, the northwestern island, is lower than the other two; it rises to a height of 328 feet. The villages are small and insignificant, and are in places built on poles on the reefs. The coast line on the south and southwest side is rocky, but has a number of short sandy beaches. The southern part of the eastern side is covered with mangrove trees. The entire island is heavily wooded; there are some scattered coconut plantations. There is no anchorage near this island. The passage between Pandjang and Koon, to the northward, is clear of dangers, but there are violent currents and cross currents setting toward the Koon Reef on the

flood.

Manawoka (Goram), southeast of Pandjang, is the highest island of the group and rises to a height of 1,178 feet in Lololi Hill, which resembles a table mountain, but is more pointed when seen from the north or south. The coast is alternately low and rocky. The west coast is practically uninhabited, but on the east coast are a number of villages with large coconut plantations. Anchorage can be found at several places.

4-111 Amar Roads ($4^{\circ}05' S.$, $131^{\circ}19' E.$), on the northeastern side of Manawoka, afford suitable anchorage on or near the $6\frac{1}{2}$ -fathom bank north of the village, but the anchorage is not so favorable at the height of the monsoons, especially the north monsoon, when a heavy sea may be experienced. Landing is difficult at that time. The village and the flagpole in it are difficult to make out, but on the approach of a vessel the national flag is hoisted. On the drying reef east of the flagpole are some large rocks that are submerged only at the highest water level.

Gorong (Goram Laoet), the easternmost island of the group, consists of a range of hills which attain a height of 1,053 feet in Watoe Keliang. From the eastward a small group of trees, the tops of which are 912 feet above sea level, are seen to extend above the thick forest of the northern part. As a rule the coasts are low and covered with coconut plantations. Tanjong Assan, the northwestern point, is rocky; Tanjong Namalen, the northeastern point, is sandy. Anchorage can be found at several places.

4-112 Ondoer Roads lie on the western side of Gorong. At this place the shore is fronted by reefs and shoals which lie up to one-half of a mile offshore, but a navigable channel leads in a general northeasterly direction to the village. The outer shoal on the northern side of the channel has a depth of $2\frac{1}{4}$ fathoms. Larger vessels may find anchorage in about 22 fathoms in the outer

BANDA ISLANDS

part of this channel. At the point where the channel turns to the northward, it is marked by two beacons (private), the northern with a triangular topmark and the southern with a ball topmark. An additional beacon with a small triangle topmark is placed about 100 yards eastward of the northern beacon previously mentioned. Northward, off the village, is a small reef marked on its southern tip by a beacon with white triangular topmark.

Kaliakat Roads, near the southern end of the east coast of Gorong, is in a small bay with a sandy bottom over which the depths decrease regularly toward the head. The bay may be recognized by a red spot close south of the rocky southern entrance point; the spot is easily made out from the north, northeast, and southeast. One can safely enter the roads on a 265° bearing of the white bridge over the mouth of the stream south of the southern mosque.

4-113 BANDA ISLANDS, about 65 miles southwestward of the southeastern end of Ceram, are a group of 10 hilly and mountainous islands, most of which are separated from each other by deep passages. About June and September the sea for several miles around the islands assumes a milky-white color, as though a thin mist covers the surface. This is attributed to the presence of animalculæ close to the surface.



Earthquakes occur very often, and violent eruptions of the Vuurb erg Volcano (Goenoeng Api) have been recorded.

With the exception of Soeanggi, all of the islands are inhabited. The people make their living by fishing and by nutmeg and coconut cultivation. The retail trade is in the hands of Chinese and Arabs.

Currents.—As the Banda Sea is subject to the monsoon drifts, strong currents will be encountered in the passages between the

islands; their velocity is more or less dependent on the width of the passages. In the narrower channels of the main group of the islands tidal currents dominate. Current rips will also be encountered near the Banda Islands.

4-114 Soeanggi (Sewangi) ($4^{\circ}19' S.$, $129^{\circ}42' E.$), the northwestern island, is a large rock, 351 feet in height, with almost vertical bare sides but a wooded top. Except on the west side, a coast reef fringes the shores.

4-115 Roen (Run), 13 miles south of Soeanggi, attains a height of 666 feet in Gandoelang Hill and has a coastal reef on all sides. Except for the steep slope at the southwestern point, the southern slope of Gandoelang, and Roen Hill near the north point, the land rises gradually. The small low islet of Nailaka lies on the drying reef that extends from the northern end of the island.

The only anchorage near Roen is in a depth of 38 fathoms in a bight of the coastal reef between Nailaka and the eastern point of the island; this anchorage, however, is good only during the west monsoon. Water of a very poor quality may be obtained from pits; there are concrete cisterns for rain water, but after a lengthy dry spell water must be shipped from Naira.

4-116 Ai, $4\frac{1}{4}$ miles east-northeastward of Roen, is 476 feet high and is fringed by a drying reef on all sides. In general, the island is steep; only on the north side is somewhat of a slope found. When seen from a considerable distance it has a flat appearance, with the conspicuous and highest hill, Kota Perampoean, on the eastern side. The northeastern and northwestern points are high.

The sea bottom on the northeast and south sides of the island is too steep for anchoring. On the west side, where the 100-fathom curve lies farther from the island, is a small area where large vessels may find anchorage in a depth of 38 fathoms over sand and stones. It can be approached with the northwestern point of the island bearing 060° , until the southern side bears 128° . Ai village, with Fort Revenge in its western part, lies on

THE SOUTHERN MOLUKKAS

the northern side of the island. Water is obtained as at Roen.

4-117 Groot Banda (Lontor) Island, 10 miles east of Roen, is fairly high most everywhere. A chain of hills and small mountains runs through the entire length of the island. Bandera, a 1,759-foot mountain, is the highest point, but it is not very conspicuous. Peri, a 577-foot hill, is the highest elevation of the tongue of land extending from the eastern end of the northern side of the island. Generally speaking, there is very little drying coastal reef except on the northern side of the western half. The majority of the villages are located on the north side. Lontor, abreast of Goenoeng Api, is built on the slopes of an old crater; a stairway of about 200 steps leads from the landing place to the village. The bays on the south side of the island are too deep for anchoring, and landing is difficult on account of the breakers.

4-118 Goenoeng Api (Gunung Api), close north of the western end of Lontor, is separated from that island by Lontor Channel, which is very much restricted by the reef extending from Lontor. The island consists almost entirely of a volcano, Vuurberg, which rises to a height of 2,152 feet; its upper part is bare. Clouds of smoke and fumes rise continuously from two craters and from crevices in the sides. The summit is more or less flat with the craters on either side. On the northeastern side is a small peninsula formed by the steep Oeloeweroe Hill, which rises to a height of 308 feet. Only the west side of Goenoeng Api is free of drying reefs. With due precautions vessels can anchor off the southwest side of this island.

4-119 Neira (Naira), close east of Goenoeng Api, is not as hilly as the other islands, but rises to a height of 820 feet in Papenberg. It is separated from Goenoeng Api by Zonnegat whose northern entrance is divided into two channels by Kraka Islet, 85 feet high. The southern entrance to this channel is practically obstructed by a shoal reef, over which the greatest depth appears

to be 2½ fathoms in a very narrow passage. Oostgat, the wide channel between Pisang and Naira, is deep and clear.

Pisang Islet, 218 feet high, is somewhat over one-half of a mile north-northwest of the northern extremity of Lontor, is covered with coconut trees, but has a large conspicuous bare rock on its northern point. The passage between it and the northern point of Lontor is known as Selamo Channel. Kapal is a small bare rock north-northwest of Pisang.

Pisang Islet was reported (1958) to be a good radar target up to a distance of 21 miles.

Tidal currents.—Strong tidal currents set through the channels. In the roadstead southward of Naira, the current sets eastward during the flood, and westward with the ebb, at a rate up to 3 knots.

4-120 Banda (Neira) Roads ($4^{\circ}32' S.$, $129^{\circ}54' E.$) consists of two parts, one south of Neira, and the other in the southern part of Sun Channel. In the southern roads one can anchor in any depth desired over a bottom of sand, coral, and stones. The roads in Sun Channel are rather deep for anchoring; it is, therefore, best to moor at the Government pier. This place is subject to squalls which come down off Goenoeng Api, and for that reason it has been found advisable to moor with the bow to the northward and an anchor laid out ahead.

Lights.—A light is exhibited from a post on the head of the eastern pier when a vessel is expected or is in the roads south of Neira.

Two lights are occasionally shown from the Government pier.

Tides.—At Banda Roads there is both a diurnal and a semidiurnal tide, but the latter predominates. The spring lows of the two tides may coincide. The lowest water level occurs in May or June and in November or December. The maximum rise and fall that can be expected are, respectively, about 2.6 feet above and 4.3 feet below mean sea level.

4-121 DIRECTIONS.—Approach from the north to the roads south of Neira is clear and should present no difficulty. Vessels approaching from the westward by way of Lontor Channel will find the passage rather narrow; the northern side of this channel should be favored.

Vessels bound to the road in Sun Channel can pass either westward or eastward of Kraka Islet. To pass westward of this islet bring the small village (built on poles on the beach) on the Neira shore, south of Papenberg, just clear of the northeast side of the small peninsula formed by Oeloeweroe Hill, which will lead in a least depth of 6 1/2 fathoms. The shoal parts on the starboard hand are usually marked by discoloration. To pass eastward of Kraka Islet bring the southern end of the government wharf in range with the east side of the small peninsula; this will lead in midchannel through this part.

4-122 NEIRA VILLAGE (formerly Banda Neira) lies on the southwestern part of Neira Island. In the western part are the warehouses and the Chinese section. In the eastern part are the European section, the old forts Belgica and Nassau, the residence of the government officials, and the military garrison. The climate is healthy.

PIERS.—On the southern side of Neira are two stone piers for boats. There is no water

alongside either of them at low water. The government wharf, on the western side of Neira, has depths of 15 to 26 feet alongside.

SUPPLIES.—Provisions are scarce and very expensive. Drinking water is also scarce. At Kombir (Combir), on Lontor, southeast of Neira, is a well from which good drinking water can be obtained.

COMMUNICATION.—Vessels call here regularly. A radio station maintains communication with the general telegraph system.

MEDICAL.—There is a doctor in the town.

4-123 ROZENGAIN, 5 miles east-south-east of Lontor, is fringed by a drying shore reef except on a part of its southwest side. It has two hills of which Lari, the northern, is 561 feet in height and wooded. Kota Batoe Merah, the southern, is 558 feet in height, bare, and conspicuous. A large rock lies on the coastal reef on either side of the northeastern point of the island. The only village on the island is located near a small sandy beach on the northern side. There is no anchorage near the island.

ROZENGAIN REEF, 2 miles south-south-east of Rozengain Island, dries to the extent of 3 feet at low water springs on its northern part. It is always marked by heavy breakers. There is no anchorage in its vicinity.

CHAPTER 5

BANDA SEA TOGETHER WITH KAI, AROE, SERMATA, AND TANIMBAR ISLANDS

5-1 THE BANDA SEA is generally regarded as being limited on the west by the east coast of Celebes and the Banggai Archipelago, on the north by Ceram, together with the adjacent islands, on the east by the Kai and Tanimbar groups of islands, and on the south by the chain of islands extending eastward from Timor.

The islands in and adjacent to this sea are under the jurisdiction of the Republic of Indonesia. Vessels visit the various islands occasionally.

The Banda Islands would properly be included in the description of this sea, but for the sake of convenience they have been included with the islands adjacent to Ceram and have been described in the preceding chapter. The Toekang Besi Islands and Timor and Wetar, together with the islands westward of them, are described in H. O. Publication No. 72, Sailing Directions for Celebes, Southeast Borneo, and Java. Kisar and the islands eastward of Timor are described in this chapter.

5-2 CURRENTS.—Very little is known about the currents in the open part of the Banda Sea, except that the winds set up perceptible surface movements. In the western part of the sea, south of the Banggai Archipelago and the Soela Islands, the current during the north-northwesterly monsoon sets east-southeastward at a rate of 0.8 to 2 knots, and during the south-southeasterly monsoon it sets north-northwestward at a rate of 0.6 to 2 knots.

5-3 TIDES—CLIMATE AND METEOROLOGY.—General remarks on these subjects will be found in chapter 1.

5-4 LUCIPARA ISLANDS (5° 29' S., 127° 31' E.), situated in the central part of the Banda Sea about 110 miles southeastward of Boeroe, consist of four coral islands named, respectively, Mai, Laponda, Kaurangka, and Selatan; these islands lie on a reef about 5 miles long in a northwest-southeast direction. The reef extends farther than charted. Although the islands are uninhabited, turtle fishermen from Boeroe and Amboina frequent them during the months of October, November, December, and, sometimes, April. Drinking water may be taken from wells on the northwest side of Mai, the northwestern-most and largest island of the group.

The islands are wooded and can be used advantageously at a distance of as much as 15 miles for taking bearings; the tallest trees, more than 100 feet high, are on Mai. The reef is so steep-to that there is no good place to anchor, but boats may be landed at several different places when the sea is calm.

Lucipara Islands give a good radar return from a distance of 15 miles.

Irregular currents and whirlpools have been observed close southward and northwestward of the islands.

5-5 SKARO REEF, located about 6 miles southwestward of the Lucipara group, is separated from that group by a clear deep channel. On the reef, which is about 3 miles in extent and steep-to, there are two clear

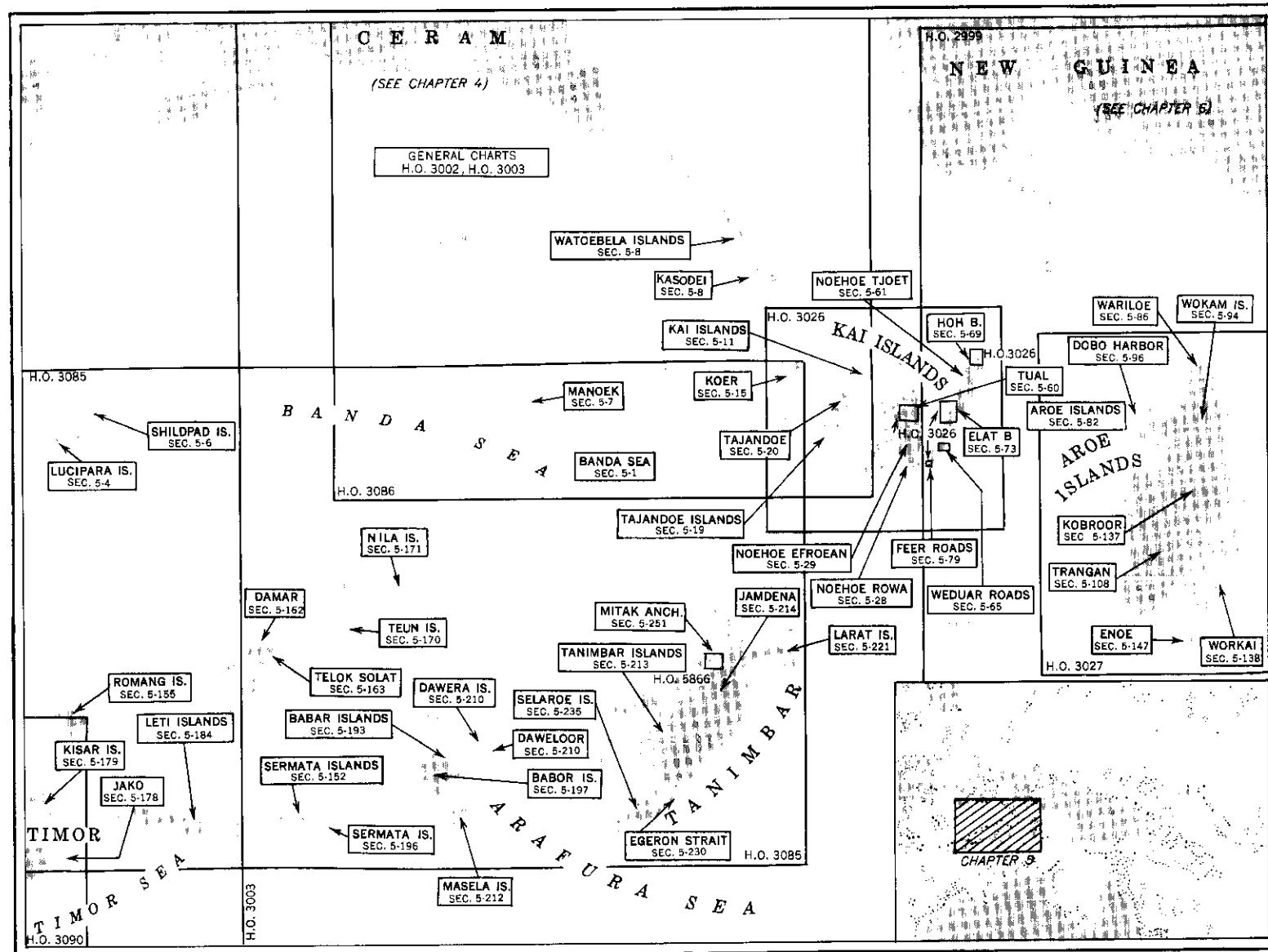
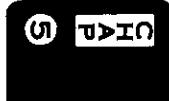
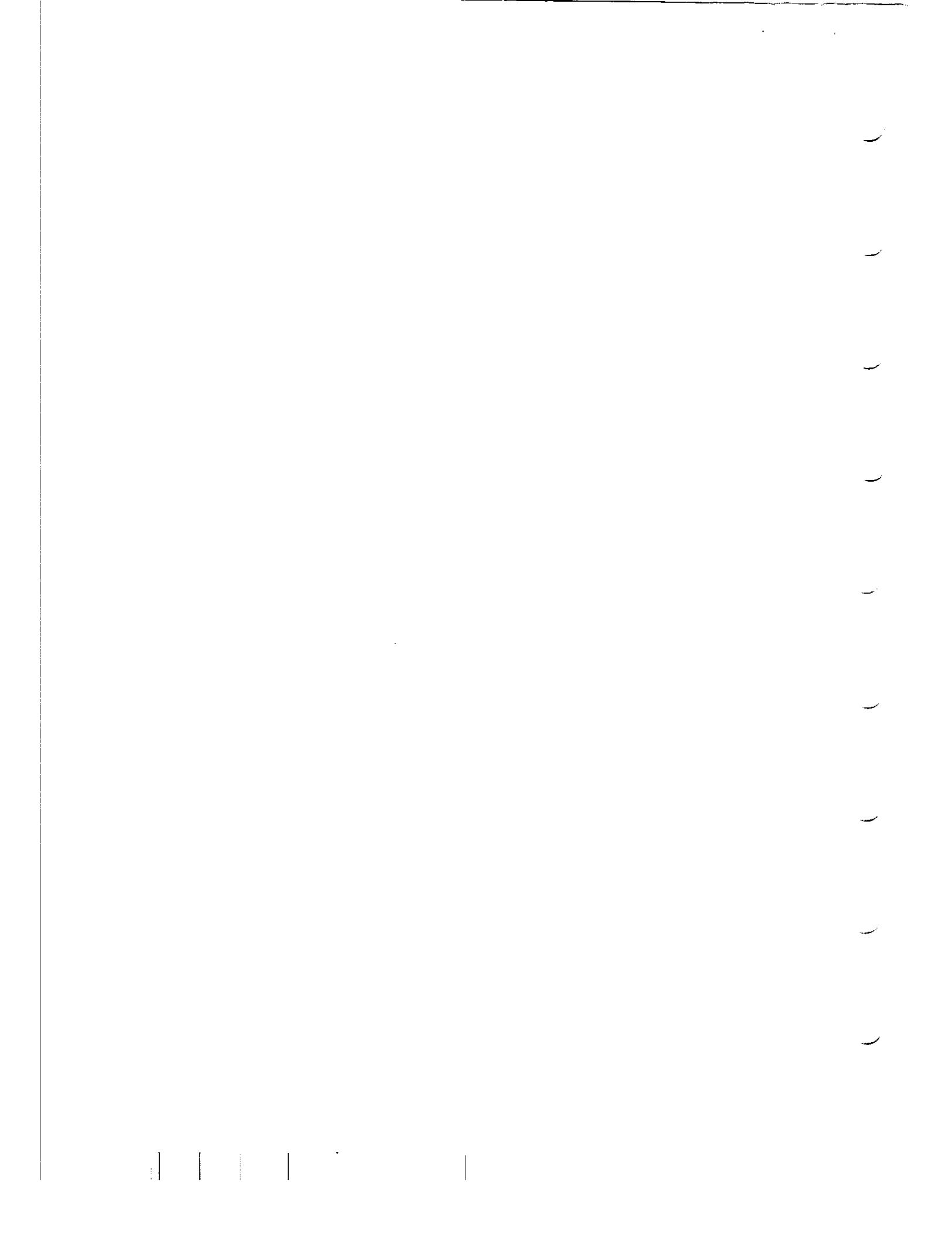


Chart limits shown are of the best scale charts issued to naval vessels by the U.S. Navy Hydrographic Office.
Section numbers refer to the place in the text where a description of the designated locality begins.

CHAPTER 5—GRAPHIC INDEX





white sandbanks that cover only during exceptionally high water.

Current.—Irregular tidal currents and eddies have been observed close southward and northwestward of the Lucipara Islands.

5-6 **Schildpad Islands**, located about 15 miles east-northeastward of the Lucipara group, consist of three low coral islands, Mai, Kadota, and Bingkoedoe. These islands stand on reefs and are separated from one another by clear deep channels. Because of the high trees on them, the islands can be made out at a distance of 15 or 16 miles. The steep coral reefs that fringe these islands make anchorage impossible. Drinking water may be obtained from a well on the north side of Mai, the largest and southeasternmost island; there are wells on the other two islands, but the water in them is not very good.

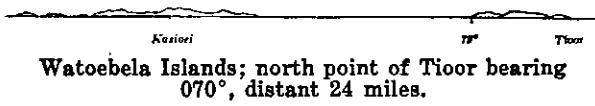
5-7 **Manoek** ($5^{\circ}33' S.$, $130^{\circ}18' E.$ [REDACTED])

[REDACTED], located about 150 miles eastward of the southeastern Schildpad Island, is a cone-shaped volcanic island, 935 feet high, 1 mile long north-northwest and south-southeast, and one-half of a mile wide. In the center of the island is an open crater which can best be seen from the south-southeastward; no eruptions have been recorded, but sulphurous fumes have been reported to rise from the crater, and there is a large amount of sulphur on the island. The lower part of the northern side of the island is wooded. On the west side of the island there is a small sandy beach; a coral reef, which projects out about 220 yards in its northern part skirts the shore between this beach and the northwestern extremity of the island.

Anchorage.—Small craft can anchor in 44 fathoms about 300 yards from the sandy beach in calm weather, and during the transition period of the monsoons.

5-8 **THE WATOEBELA ISLANDS**, located about 60 miles southeastward of the southeastern extremity of Ceram, include

Ingar, Watoebela, Kasioei, Koerkap, Baäm, Tioor, and Oeran. The first three lie on a long, steep-to, submarine plateau on which there are depths of less than 110 fathoms; the other islands of the group are located on separate reefs that are surrounded by very deep water. Some of the natives are Mohammedan; the rest are heathen.



Ingar, the northernmost island of the group, is low and entirely surrounded by a white sandy beach; it is uninhabited, but on the island there are some coconut plantations belonging to inhabitants of Watoebela. This latter island, 705 feet high, is covered with large trees; on it there are several villages with a total population of about 600. Kasioei, separated from the southeastern end of Watoebela by Horot Lomi Strait, which is about 1,000 yards wide, is the largest island of the group; the highest of its several hills, located $2\frac{3}{4}$ miles from the southeastern end of the island, has an elevation of 1,152 feet. There are several heathen villages on the island. On Baäm there are two hills, the northern 262 feet high and the southern 203 feet high, separated by a low sandy area which makes it appear as two islands; a wide reef surrounds the island. Koerkap, located $6\frac{1}{4}$ miles eastward of the southeastern end of Kasioei, is low, flat, and surrounded by a wide reef.

Tioor (Tiur) ($4^{\circ}45' S.$, $131^{\circ}48' E.$ [REDACTED])

[REDACTED], lying $5\frac{1}{2}$ miles southward of the southern end of Baäm, is very hilly, with a maximum elevation of 1,234 feet; on the island there are four villages with a combined population of about 400, mostly Mohammedans. Oeran, situated $6\frac{1}{2}$ miles eastward of Tioor, is low, sandy, and largely

(Chg 5)

covered with coconut trees; an extensive reef surrounds the island. On Baäm, Koerkap, and Oeran, all of which are uninhabited, there are coconut plantations belonging to the inhabitants of Watoebela and Tioor. Drinking water is said to be obtainable at a village near the northern end of Tioor.

5-9 Shoals.—A drying reef lies one-half of a mile eastward of the southeastern end of Koerkap. Within a distance of 1 mile eastward of Tioor there are several detached $2\frac{3}{4}$ - to $5\frac{1}{2}$ -fathom patches; a good berth should, therefore, be given to the east side of this island. In the otherwise deep and clear channel between Tioor and the northernmost island of the Kai group there are three shoals over which there are depths of $2\frac{3}{4}$, 5, and 6 fathoms, located, respectively, 16 miles south-southeastward and $21\frac{1}{2}$ and 23 miles southeastward of the southern end of Tioor.

Currents.—In the vicinity of the Watoebela Islands the flood current has been found to set eastward and the ebb current westward; the strength of the flood current is increased during the northwestern monsoon, and that of the ebb during the southeastern monsoon. Between the islands the strength of the currents is often considerable. In February and March an easterly-setting current with a velocity of $3\frac{1}{2}$ knots has been reported. When the monsoons are blowing with their maximum velocity, strong rips are set up off the north and south ends of the islands.

5-10 Anchorage.—There are no good anchorages in the Watoebela group of islands, but there are several places where temporary anchorage may be taken. Anchorage can be taken close northwestward of Ingār in a depth of 21 fathoms, stone bottom; the currents, however, are strong in this locality. There is another anchorage off the northwest end of Watoebela Island, but there too the currents are strong and the holding

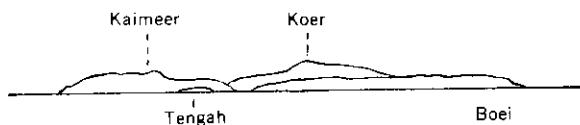
ground poor. During the southeasterly monsoon a comparatively comfortable anchorage is off the village near the northern end of Tioor in a depth of 30 fathoms, sand and stones.

5-11 THE KAI (KEI) (EWAB) ISLANDS, lying between the parallels of $5^{\circ}07'$ S. and $6^{\circ}03'$ S. and the meridians of $131^{\circ}55'$ E. and $133^{\circ}11'$ E., may be divided into four groups, namely, the Koer Islands ($5^{\circ}17'$ S., $131^{\circ}58'$ E. [REDACTED]), the Tajandoe Islands, Noehoe Rowa, and Noehoe Tjoet. The islands are almost entirely formed of coraline limestone, covered with magnificent forests; coconut trees grow in abundance on these islands. The islands are all, with the exception of Noehoe Tjoet, comparatively low, and most of them are encircled by extensive reefs. On Noehoe Tjoet there are numerous small streams which generally dry in the east monsoon; on the other islands water is obtained from wells. There are no roads on any of the islands, but some of the villages are connected by footpaths.

The population of the islands is estimated at over 20,000 of whom about one-third are Mohammedans, a few are Christians, and the rest are heathen; these latter are the original inhabitants and have the characteristics of a Malay-Papuan race. These people are well disposed to strangers, and live in villages along the coasts. Among them are expert boat builders and good blacksmiths; agriculture consists of the cultivation of cereals and fruits. The waters among the islands abound in fish, but fishing is seldom carried on outside the reefs. The natives engage in extensive barter trade in local produce with Ceram, Amboin, Banda, and the Aroe Islands; the greater part of the trading is done during the months of October, November, February, and March.

5-12 THE KOER (KUR) ISLANDS, the northernmost of which lies 23 miles south-

eastward of Tioor, consist of four islands named Boei, Tengah, Kaimeer, and Koer. The total population of this group, together with that of the Drie Gebroeders, is about 1,000; they are Mohammedans who, however, have retained many of their heathen characteristics. The islands are all wooded.

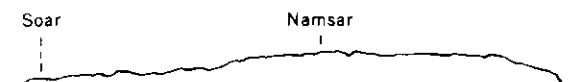


ISLANDS NORTH OF KOER; WEST POINT OF
BOEI BEARING 191°, DISTANT 8 MILES

Boei, the northernmost islet of the group, is 187 feet high and well-wooded. The north coast is steep and rocky, the south coast is sandy. Although the island is uninhabited there are, on the southern part of the island, coconut plantations belonging to the people of Kaimeer.

5-13 **Tengah**, located on a reef that connects Boei and Kaimeer, is really a sandbank that is covered entirely with coconut trees. The island may be temporarily inhabited during certain seasons of the year.

Several shoal patches and reefs, with depths of about 1 fathom, lie about $\frac{1}{4}$ mile offshore along the east coast of Tengah.



ISLANDS NORTH OF KOER; SOUTH POINT OF
KAIMEER BEARING 062°, DISTANT 8 MILES

5-14 **Kaimeer**, composed mainly of coral lime, rises in terraces to a height of 495 feet; the island has a flat top and, from seaward, has the appearance of a large fort. The southeast side of the island is rocky and rises steeply from the sea. There is a conspicuous small mosque about midway of the western side of the island. The island is sparsely wooded, but on the west coast there are several coconut plantations.



KOER ISLAND; NAMSAR BEARING 141°,
DISTANT 8 MILES

5-15 **Koer (Kur)** ($5^{\circ} 21' S.$, $132^{\circ} 00' E.$), the southernmost of the Koer Islands, is a hilly island, about 5 miles long northeast and southwest, that rises in its central part to a height of 1,388 feet. Namsar, the highest hill, is located in the central part of the island; from the north this hill appears to be very sharply pointed. The land rises steeply from the sea on the northern and eastern sides, but on the western side, where most of the villages are situated, the land slopes gently. The southern part of the island is very uneven; the southern extremity shows a broad cleft that extends down to the sea. Within the southern point of the island the hills rise in a succession of terraces, by means of which the island is easily recognized. A reef with a maximum width of about one-half of a mile skirts the greater part of the island. The village of Remoon, located on the western side about $1\frac{3}{4}$ miles from the southern point of the island, is the place of residence of the rajah of the island. Drinking water is taken from a small river on the island.

5-16 **Anchorages**.—During the southeast monsoon medium-sized vessels can take temporary anchorage in a depth of about 38 fathoms, sand, abreast the village of Nam, $2\frac{1}{4}$ miles north of the southern end of Koer. At this position there is an indentation in the coast reef that provides a good natural harbor for small craft. On the reef there are several fish dams that are built of blocks or coral.

During the northwest monsoon temporary anchorage can be taken in a depth of 38 fathoms eastward of the northern extremity of Kaimeer; this anchorage, however, is reported to be undesirable because of the close proximity to the coast reefs and of the danger of dragging the anchor.

5-17 **DRIE GEBROEDERS** is the name of a group of three islands the northwestern-

most of which is located 11½ miles southward of Koer. These islands, named Manggoer, Wonin, and Fadol, each of which is surrounded by a reef, are separated from one another by passages that are free of dangers.

Wonin ($5^{\circ}35'S.$, $131^{\circ}56'E.$), the northernmost islet of the group, about one-half mile in diameter and 012 feet high, is located 11½ miles southward of Koer; it is covered with trees and is surrounded by a reef. The island is uninhabited, but there are some coconut plantations on it.

Manggoer, the northeasternmost and largest island, is 1¼ miles long, nearly 1 mile wide, and 138 feet high; it is surrounded by a reef that extends out to a maximum distance of 900 yards. Several small villages are located on the low northern part of the island. There is a small fresh water lake on the island.

Fadol Islet, the southernmost of the group, is about 1 mile in diameter, 444 feet high, and lies 5¼ miles southwestward of Manggoer. The island is rather steep and, on the east side, can be approached fairly closely; on the other sides, however, the reefs project some distance from the island. On the northern end, which is low, there is a village.

5-18 Anchorage.—During the southeast monsoon there is safe anchorage near the northern end of Manggoer; with southwesteरly winds anchorage can be taken on the northeastern side of that island.

5-19 TAJANDOE (TAJANDU) ISLANDS.—This group consists of three large and four small islands with a few outlying rocks. These islands are all of coral formation, are densely wooded, and are surrounded by extensive reefs. The group extends 19 miles in a northeast-southwest direction and has a width of about 8 miles. The southwesternmost island, Taam, is 440 feet high and round-backed. On the other islands

there are low hills which, however, can be seen at a distance of 12 to 15 miles.

The population of the group is about 1,300, all Mohammedans; among the occupations of the inhabitants are the building of boats and the making of earthenware. There is some good timber on the islands.

5-20 Tajandoe (Tajandu) ($5^{\circ}33'S.$, $132^{\circ}19'E.$), 282 feet high, is the northernmost and largest island of the group. Close northward of Tanjung Matot, the northeastern extremity of the island, is Matochanat (Matotjanat), a small rocky island. On the coastal reef off the northwestern side of the island there are several rocky islets on some of which there are a few trees and shrubs. The northern side of the island is deeply indented by an inlet where vessels can anchor; in this inlet, however, there are several shoals and reefs which are hard to avoid because of the discolored water. Jembro village, located on the northwestern extremity of the island, is the seat of government for the group; in the village is a conspicuous mosque. On the shore of the inlet mentioned above there is a village that is surrounded by a wall about 10 feet high.

A shoal, dangerous to navigation, lies about $2\frac{1}{3}$ miles off the northern side of Tajandoe.

The inlet on the northern side of Tajandoe is known as Longiar Bay, but navigation is difficult without beacons. When entering, the village of Longiar bearing 206° leads about 200 yards clear of the shoal northwestward of Tanjung Matot.

5-21 Off-lying dangers.—Within the line of soundings northward and westward of Tajandoe there are several dangers among which are Rembang Reef with a least depth of $6\frac{1}{2}$ fathoms, and depths of 7 and 8 fathoms within 1 mile northward of it, located 6 miles northward of Tanjung Matot; Telegraaf Reef with a least depth of 8 fathoms, located $3\frac{1}{2}$ miles northward of Tanjung Ma-

tot; and Huisman Reef with a least depth of 3 fathoms, located $5\frac{1}{4}$ miles west-northwestward of the northwestern extremity of Tajandoe. An 8-fathom patch lies $4\frac{1}{2}$ miles west-northwestward of the northwestern extremity of Walir. There are probably other dangers within the bank of soundings in the vicinity of these islands.

5-22 Walir, the next largest island of the group, lies close southwestward of Tajandoe. The channel between the two islands is obstructed by a reef and several shoal spots. Walir is uninhabited. Heniaar Island lies on the reef eastward of Walir; on the northwestern part of Heniaar is the village of Jamtil in which there is a conspicuous mosque. Watleu is a small rocky islet on the southern end of the reef southward of Walir.

5-23 Waratneu is a small island between Walir and Tajandoe Islands. A 5-fathom shoal lies $2\frac{1}{2}$ miles northwestward of Waratneu Island.

Large vessels can anchor east or west of the region of reefs lying between Tajandoe and Walir. In the western anchorage a vessel should keep west of Waratneu Island. In the east monsoon this is a good berth. In the eastern anchorage a vessel is safe during the west monsoon south of Tanjong Watloren, the southern point of Tajandoe. To reach this anchorage a vessel should steer for Waratneu Island on a west-northwesterly course until the last island on the reef east of Walir disappears behind the eastern rocky coast of Heniaar.

On Tajandoe, the 282-foot summit of Goenoeng Radjah and a church tower at Chiil are conspicuous.

The passage between Tajandoe and the reef of Walir is suitable for only launches and pros.

5-24 Ree and Reejanat Islets lie on a reef close westward of Walir; the former is

bold and 108 feet high, the latter is a wooded sand bank. The water area between these islets and Walir is too shallow and irregular to be used as a channel.

5-25 Nusreen, Nuniai, and Noewait, located on an extensive reef $2\frac{1}{2}$ miles south-southwestward of the southern end of Walir, are low and sandy; the first two are covered with coconut trees. The channels northward and westward of the reef on which these islets lie are about $1\frac{1}{4}$ miles wide and free of dangers.

5-26 Taam ($5^{\circ}44' S.$, $132^{\circ}10' E.$, H. O. Chart 5866), located $2\frac{1}{4}$ miles southwestward of the western end of Nuniai, is, except at its northeastern extremity, quite bold; it has a maximum elevation of 440 feet. On the reef that encircles the island are numerous rocks. The most noticeable of these is Watfera, a large flat-topped rock located close off the western side of Taam; a conspicuous tree that stands on Watfera gives the rock the appearance, when seen from the north, of a ship with one mast. On the reef three-fourths of a mile north-northeastward of Watfera is a large white rock. There are two villages on the western side of Taam. The island is ruled by a rajah.

Vessels can anchor in a depth of 12 to 30 fathoms off the middle of the western side of Taam and be sheltered against all winds except southeasterly monsoons; this anchorage is especially uncomfortable when these winds are blowing against a southward-setting current.

5-27 Tides.—In the vicinity of Tajandoe Islands there is both a diurnal and semi-diurnal tide, but the latter predominates. The low water springs of these two tides sometimes coincide. As a result of this coincidence the lowest water level that can be expected is about 3.6 feet below mean sea level; this occurs twice a year, around June and December. The highest water level that can

be expected is about 2.6 feet above mean sea level; this occurs at all semidiurnal spring tides.

5-28 THE NOEHOE ROWA (NUHU ROA) group of islands, located eastward of the Tajandoe Islands, consists of two large and a number of smaller islands, all of which are located on a bank of soundings over which there are depths of less than 100 fathoms. The group occupies an area about 40 miles long and 20 miles wide.

5-29 Noehoe Efroeane (Nuhu Efruan).—The central and largest island of the Noehoe Rowa group has no name, but it consists of three sections that are named, from north to south, Noehoe Tawoen (Nuhu Tawun), Noehoe Efroeane, and Noehoe Toetoet (Nuhu Tutut). Inasmuch as the section named Noehoe Efroeane comprises the greatest part of the island that term will hereafter in this work be applied to the entire island; it must be understood, however, that this is done only for convenience and that "Noehoe Efroeane" is not to be taken as the generally accepted name of the island.

Noehoe Efroeane is about 22 miles long, north and south, and $7\frac{1}{2}$ miles wide. It is of irregular outline and is deeply indented in several places. It is covered with trees, and is generally low although it does have a few hills of moderate elevation; the highest of these, Gelanit, located $3\frac{1}{2}$ miles southward of the northernmost point of the island, has an elevation of 390 feet.

5-30 North coast.—The north coast of Noehoe Efroeane between the northernmost point of the island and Tanjung Ngidiun, the northwestern extremity, located 6 miles to the westward, is characterized by alternate stretches of cliffs and sandy beaches. Tanjung Ngidiun is a rocky headland that rises gradually to a height of 259 feet. In the middle of this coast is a large but unimportant bight the east shore of which is com-

posed of limestone cliffs that average about 40 feet in height. Fronting the coast is an extensive reef which, however, ends at Tanjung Ngidiun. There are a few villages along this coast.

5-31 Reefs and islands northward of Noehoe Efroeane.—Ender Rock ($5^{\circ}20' S.$, $132^{\circ}40' E.$, *H. O. Chart 3026*), the northernmost danger of the Noehoe Rowa group, is a coral patch one-half of a mile in extent over which there is a least depth of $3\frac{1}{4}$ fathoms; it is located $6\frac{1}{2}$ miles west-northwestward of the northern extremity of Maas Island and may be distinguished by the discolored water.

Batavier Reef, located 3 miles northeastward of the northern extremity of Maas Island, has a least depth of $2\frac{3}{4}$ fathoms. It is about one-half of a mile in extent and is reported to be marked by discolored water.

Datu Reef, about 1 mile in extent, lies 1 mile northward of the northern end of Maas Island; the least depth on the reef is said to be $2\frac{3}{4}$ fathoms. Discolored water marks this reef.

Tegal Reef, located 3 miles north-northeastward of Tanjung Serbat, the northern extremity of Kei Dulah Island, has a least depth of $3\frac{3}{4}$ fathoms.

There are many other dangers in the vicinity of these reefs.

Baeer and Maas are two islands lying about 9 miles northward of the northern extremity of Noehoe Efroeane; there are numerous coconut trees on these islands. The islands are about 670 yards apart and are connected by a reef which extends $1\frac{3}{4}$ miles eastward from Maas. Watlora Islet lies on this reef about 400 yards eastward of Maas. Sua Island is located nearly 1 mile southeastward of Maas.

Rumadan, lying nearly 3 miles northwestward of Tanjung Serbat, is almost divided into two parts. Detached reefs extend for a distance of $3\frac{1}{2}$ miles westward of Rumadan.

Dranan is a small islet located about three-fourths of a mile southward of Rumadan.

5-32 Doe Roa Island ($5^{\circ}32'S.$, $132^{\circ}42'E.$), lying southwestward of Roemadan, is the largest of the islands that lie northward of Noehoe Efroeans. It is surrounded by a reef which extends $1\frac{1}{2}$ miles westward and about one-half of a mile northward and southward on the island; on the reef southward of the island there is an islet. A detached $1\frac{1}{2}$ -fathom shoal lies close off the southeast side of the island. An islet stands on this shoal. There are two villages on the northeast side of the island.

Doe Roa Island is separated from the reef southward of Roemadan Island by a channel that has a width of over 600 yards. In mid-channel, at about $3\frac{1}{2}$ miles due west of Dranan Islet, a shoal with depth of $3\frac{3}{4}$ fathoms was reported in 1952. At about $1\frac{1}{4}$ miles westward of Dranan is a least depth of 7 fathoms, sand and shells.

Oet Island, located 2 miles southwestward of Doe Roa and nearly 1 mile northward of the northern part of Noehoe Efroeans, is a narrow, somewhat crescent-shaped islet which is rocky at the ends and of a low sandy formation in the middle. A reef extends about three-fourths of a mile westward from the island, but it can not always be distinguished by the color of the water. Kroe, a low rocky islet, is located on the reef close westward of Oet Island; there is a small but conspicuous sandy beach on the north side of the islet.

5-33 Doe Roa Strait is the channel between Doe Roa Island and the northern side of Noehoe Efroeans. On the northern side of the channel is the reef that extends westward and southward from Doe Roa Island, and also a detached reef that lies a little more to the southward. On the southern side of the channel are Kroe, Oet, and Oeboer (Ubun) Islands and a detached reef, dry at low water, which lies northwestward of the latter island. The navigable width of the strait is about 500 yards, with a least depth of 10 fathoms at its east end.

Shoals.—Several shoals over which there are depths of $3\frac{1}{4}$ to 9 fathoms lie in the western approach to Doe Roa Strait at a distance of about 3 miles eastward of Godon Island.

The north end of a $4\frac{1}{4}$ -fathom bank lies about $1\frac{1}{2}$ miles off the reef which extends northwestward from Oet and Kroes Islands. A 16-foot shoal extends nearly 1 mile northwestward from Kroes Island. A 14-foot shoal lies about 1 mile northwestward of the north point of Oeboer Island.

Beacons.—Two black iron beacons, each with a black cone topmark, are located on the southern edge of the shoals on the northern side of Du Roa Strait. The shoal on which the western black beacon is located is extending southeastward. Vessels should keep about 500 yards southward of the line of the two beacons, between Kroes Island and the reef.

5-34 West coast of Noehoe Efroeans.—The west coast of this island is irregular and trends south-southeastward for about 22 miles from Tanjong Ngidioen (see sec. 5-30) to Tanjong Doan. This coast is, in general, rocky, alternating here and there with sandy beaches, and is fronted by a broad reef, it is backed by hilly land. The village along the coast can usually be recognized by their small churches or mosques.

The coast between Tanjong Ngidioen and the point 5 miles to the southward forms a bight the shores of which consist alternately of small sandy beaches and cliffs 30 to 40 feet high. Along this stretch of coast there are three villages; in Ngilgof, the southernmost, there is a church. The coast from the point westward of Ngilgof village bends eastward and forms a tongue of land on the eastern side of which there are two shallow coves that are closed by reefs. Beyond the eastern cove the coast trends southward.

5-35 Totoad Bight.—Southward of Soelaer village, which lies 2 miles south-southeastward of Ngilgof, the coast forms a wide bight, narrowing to a creek, which pene-

a drying reef that is nearly one-half of a mile in diameter. Another coral patch lies southward.

5-56 Winds and weather.—In November the northwest monsoon sets in; during December the winds blow predominately from the west and west-northwest with an average velocity of about 6 knots, but winds of very considerable force are not uncommon. Calms are frequent between November and January. In April the monsoon changes and the direction of the prevailing winds shifts to east and southeast, with those from the latter direction predominating until October. Thunderstorms are most frequent at the change of the monsoon.

There is greater precipitation among the Kai and Tanimbar groups than on Timor, which lies to the westward; this condition is caused by the southeasterly winds that blow from the Pacific through Torres Strait. The average annual rainfall at Tual amounts to about 94 inches. (See appendix II.)

5-57 Tides.—At Tual there is both a diurnal and a semidiurnal tide, but the latter predominates. The spring highs and spring lows of the two tides do not coincide. The highest water level occurs in March or April and September or October, the lowest in December or January and June or July; the maximum rise and fall that can be expected are, respectively, about 2.6 feet above and 3 feet below mean sea level.

5-58 Currents.—Little is known regarding currents in this group of islands, except that in Doe Roa Strait an easterly current has been noted during the flood and a westerly current during the ebb; the maximum recorded velocity was 2 knots.

5-59 Directions.—Vessels coming from the northward approach with the east side of Kei Dulah Island bearing 180° until Lobi Islet bears 210° and then change course to steer for that islet. This course leads close northwestward of Tegal Shoal which must be carefully avoided. When off Dulah steer for the sand patch on the otherwise rocky

northeastern point of Oeboer (Ubud) Island. When the rocky point close westward of Tual is well open westward of the land northward of the town, course should then be altered, southward to the anchorage. Care must be taken to avoid the unmarked shoals within the roadstead (sec. 5-54).

To enter Kei Dulah Harbor from the westward through Doe Roa Strait, set course for Tanjung Ngidioen from a position about 10 miles northward of that point; from this position Tajandoe Island, Er Island, and Tanjung Ngidioen afford good landmarks. Er is easily distinguished from the other islands by reason of its being lower and less overgrown. Course 180° should be steered toward Tanjung Ngidioen until the north end of Godon is nearly abeam. Then steer eastward, keeping the northwest end of Er Island astern and open northward of Godon Island. Pass between the 19 and the 26-foot shoals northeastward of Tanjung Ngidioen. When the two beacons marking the north side of Doe Roa Strait (sec. 5-38) bear 085° , steer eastward, favoring the north side. When Moeha Noehoe Janat bears 000° steer round the north side of Oeboer Island. Then proceed as directed above for Tual. The unmarked dangers along this route are best shown on the chart.

5-60 TUAL (TOEAL) ($5^{\circ}38'S$, $132^{\circ}44'E$).—The most important village in the Noehoe Roa group, is located in the southern part of the western side of Kei Dulah Island. It is situated partly on the beach and partly on the slopes of the hills that back the coast. It is also the location of the garrison for the armed police of the district and is the administration center for the region. This thriving village carries on considerable trade. It was reported (1962) a small pier, suitable for launches, is located here. There is a steam sawmili near the village. A hospital is located at Tual.

Dulah (Doelah) is another important village, located on the west side of Kei Dulah Island about $4\frac{1}{2}$ miles north-northeastward of Tual.

Piers.—Fronting the northern part of Tual village is a small boat pier on which there is a flag pole. A jetty of loose coral stones projects from the shore out to the edge of the shoal water abreast Dulah.

Supplies.—Provisions are obtainable.

Communications.—Vessels call regularly at Tual.

5-61 NOEHOE TJOET (NUHU YUT) (NUHU CHUT), the easternmost of the Kai Islands, located 4 to 13 miles eastward of Noehoe Rowa group, has a length of about 50 miles, north-northeast and south-southwest, and a width varying from 1 to 5½ miles except at the southern end of the island where there is a tongue of relatively low land about 3½ miles long and one-fourth of a mile to one-half of a mile wide. The mountainous aspect of this island distinguishes it sharply from the comparatively low islands of the Noehoe Rowa group. The entire island is wooded, but there are patches of cultivation in places along the slopes of the hills. The coast is high and bold, but here and there along the coast are sandy beaches where most of the villages are built. The coasts of the island consist principally of more or less projecting points, offshoots of the mountains and hills.

5-62 Mountains.—A chain of mountains extends along the middle of the island for almost its entire length. The mountains are well-wooded and can be sighted for a considerable distance at sea except when their summits are enveloped by clouds; the tops of those mountains, however, which attain elevations greater than 1,300 feet are usually so enveloped.

The principal mountains from south to north are Mt. Morbuit, 1,709 feet high; Mt. Wirmangle, 1,490 feet high; Mt. Nonaibal, 1,887 feet high; and Mt. Advilnas, 1,247 feet high. These four mountains are peaks of a generally steep mountain range that extends northward from the southern extremity of the island; for a considerable distance northward of Mt. Advilnas, however, this range consists of hilly ridges without any conspicuous peaks.

Close southwestward of that section of the island that is narrowed by Elat Bay is Mt. Warhuk ($5^{\circ}40' S.$, $132^{\circ}59' E.$), 1,818 feet high, which is conspicuous because of its having the shape of an elephant with its head toward the south; Mt. Siechek (Sitjek), 1,493 feet high, located 2 miles northeastward of Mt. Warhuk, may be distinguished from the latter peak by its shape, that of a truncated cone. Mt. Wakoi (Fakoi), 2,031 feet high, located $1\frac{1}{4}$ miles northeastward of Mt. Siechek, rises almost vertically on the southeast side and has many light yellow colored stone sections.

Mt. Daab, the highest peak on the island, 2,625 feet high, located about 3 miles north-northeastward of Mt. Vakoi, has a cone shape, but is usually enveloped in clouds. The Triple Mountain (Drie Topberg), 1,936 feet high, located about $7\frac{1}{2}$ miles northward of Mt. Daab, consists of three equally high peaks that form a slightly waving line as seen from seaward. Mt. Bu (Boo), 2,602 feet high, located about 3 miles northward of the Triple Mountain, has a notched top that slopes to the southward. Mt. Kaar, 2,484 feet high, located about 2 miles northward of Mt. Bu, has a rather pointed top. Northward of Mt. Kaar there are several peaks, the highest of which, Mt. Wokra, is 2,257 feet high, but they stand so close together that they are of little use as landmarks.

5-63 Valwinden.—Along the coasts of Noehoe Tjoet there are local bora-like winds, called "Valwinden" in the Netherland Sailing Directions, that sweep down in strong eddying gusts from the mountains of the island; they are especially dangerous to vessels at anchor. During the period of change from the northwest to the southeast monsoon these winds are not especially strong.

5-64 East coast of Noehoe Tjoet.—The east coast of the island is so steep-to that a vessel can proceed quite closely along the shore. The most conspicuous points along this coast are: Tanjung Weduar, the steep

~~SEA SHORT CORRECTIONS~~
 southern extremity of the island; Tanjung Ebahan (Obahan), a rocky point about 33 feet high, located $11\frac{3}{4}$ miles north-north-eastward of Tanjung Weduar; and Tanjung Wahadan, located $15\frac{1}{2}$ miles farther north-northeastward. The latter point is not particularly high, but it is rocky and the mountains immediately behind it rise steeply.

5-65 Anchorage.—Inasmuch as the east coast of the island is especially steep-to it affords no good anchorage. Moreover, it is particularly subject to the "Valwinden" (see above). Since there are neither "Valwinden" nor strong easterly winds during the change from the northwest to the southeast monsoon, vessels may, at that time, anchor in depths of 25 to 40 fathoms, sand and stones, close to the shore.

During the northwest monsoon anchorage can be taken at the places named below:

Weduar Roads ($5^{\circ}50' S.$, $123^{\circ}55' E.$), is an indentation in the coast 2 miles northwestward of Tanjung Ebahan. On the shore of the bight is a conspicuous house. Weduar village stands on a hill over-looking the inlet. A small $2\frac{3}{4}$ -fathom spot that does not discolor lies in the central part of the bight about 480 yards offshore. The preferred anchorage is in a depth of 16 to 22 fathoms with the above-mentioned house bearing 235° .

Off Hollat village, located 14 miles from the northern extremity of the island, there is an indentation in the coastal reef where small craft can find a good anchorage.

The two churches in the village are good landmarks.

Vessels approaching Hellat should steer 276° for the southernmost church. This course leads through the opening in the reef. Vessels should then anchor in $3\frac{1}{4}$ fathoms, about 300 yards off the reefs with Tanjong Noewahan $3\frac{1}{2}$ miles to the southwestward, bearing 196° . The reefs are fairly

well marked by discoloration. Cargo-transfer from lighters alongside is only possible during the northwest monsoon.

Ur Roads consist of a small inlet located $5\frac{1}{2}$ miles from the northern end of the island. The Wer Oer, a small stream which empties into this inlet, flows through a valley across which can be seen on a clear day Mt. Watnus, a sharp peak 2,024 feet high. This peak in line with the center of the valley leads to the anchorage; in case the visibility is too poor to permit sighting this peak, vessels can approach on a northwesterly or a north-northwesterly course by steering for a wooden bridge that crosses the Wer Oer just north of the village. The preferred anchorage is near the reef in a depth of about 30 fathoms, sand, at a distance of 550 yards offshore.

5-66 Villages on the east coast.—In addition to the villages mentioned above there are numerous others on the east coast of Noehoe Tjoet. Some particulars regarding the most important of them is given below. Sather and Totrean, located close northwestward of Tanjung Ebahan, are very prosperous little settlements. Ohoiwait, located about $4\frac{1}{2}$ miles northward of Weduar, is situated on a high, steep, conspicuous hill; in the middle of the village is a sacred spot called "Woma" which is surrounded by a low brick wall.

Jamtil, situated on a 70-foot hill $10\frac{1}{2}$ miles northward of Tanjung Ebahan, is the residence of the rajah of Jamtil. Jamtimur, 2 miles north-northeastward of Tanjung Wahadan, has a small but conspicuous church. Kilwat (Kilwaer), $1\frac{3}{4}$ miles beyond Jamtimur, can easily be recognized by a flagstaff at the village. Watlar, located 1 mile southward of Tanjung Kawas, is a large village that is governed by the rajah of Watlar.

Bandan Eli, situated $4\frac{1}{2}$ miles southward of Tanjong Ngarmin, may be recognized by its conspicuous mosque and the large number of red-tiled houses; this village is concealed from vessels coming from the southward by Tanjong Kawas, a high rocky point with a small rounded summit, located $3\frac{1}{4}$ miles southward of the village.

5-67 The north coast of Noehoe Tjoet is lower than the east coast, but it is characterized by spurs of the mountains that project out from the shore; Tanjong Borang, the northernmost point of the island, is the most important landmark on this coast. It is usually the first point of land to be sighted by vessels approaching the Kai Islands from the northward; the mountains to the southward of the point are usually enveloped in clouds. Between Tanjong Oratu, the northeastern extremity of the island, and Tanjong Borang the coast is generally rocky, although there are a few small sandy beaches along it. The area inside the 10-fathom curve, which extends out nearly 1 mile, is decidedly foul. On the shore reef one-half of a mile northwestward of Tanjong Oratu there is a conspicuous sandy spot.

5-68 Labuan Dabu ($5^{\circ}17' S.$, $133^{\circ}08' E.$ [redacted]), located just eastward of Tanjong Vorwahan, is an opening in the reef 300 to 550 yards wide; it affords good anchorage in depths of 4 to 8 fathoms. The western edge of a patch of woods on the shore, bearing 180° , leads to the anchorage.

5-69 Hoh Bay, situated between Tanjong Borang and Tanjong Vorwahan, is an elongated indentation that penetrates the coast for more than three-fourths of a mile; the navigable width of the bay, however, is only about 200 yards. It affords anchorage to small craft in depths of 5 to 7 fathoms, sand, at all seasons. Vessels proceeding to the anchorage pass along the Tanjong Borang side of the bay at a distance of about 100 yards offshore. On the west side of the bay

there are a number of houses that are built on piles; they are occupied only during certain seasons of the year.

5-70 Telok Wair, an inlet between Tanjong Borang and Tanjong Patingroe, the northwestern extremity of the island, affords safe anchorage during the southeast monsoon in a depth of 22 fathoms. The shore is rocky and steep except at the head of the inlet, where Wair village is located.

5-71 The west coast of Noehoe Tjoet has a wider coastal shelf than has the east coast and, therefore, affords better anchorage. The shore itself, however, is sufficiently steep-to to enable vessels to come rather close inshore. Elat Bay, located about midway of this coast, is, from the point of view of navigation, the most important place on the island.

Tanjong Patingroe is a rocky cape, about 30 feet high, that consists of a spur of the mountains; Niv Rock, located close northward of the cape, aids in identifying it. From Tanjong Patingroe to Hor village, $4\frac{3}{4}$ miles to the south-southwestward, the coast is fairly high and is characterized by gray rocks among which are many white spots. Mt. Woho, located $4\frac{1}{4}$ miles southward of Tanjong Patingroe, rises almost vertically to a height of 1,864 feet (1,774 feet on the chart). Southward of this mountain the land slopes gradually toward the middle of the island, but the coast continues rocky with a few rather conspicuous points, among which are Tanjong Ohiserkeu (Ohiserkeoem) and Tanjong Hebri. Southward of the latter point the mountains lie farther from this coast.

There are more villages on the west than on the east coast of the island. In some of these villages, all of which are easily recognized, there are conspicuous white mosques.

Anchorage can be taken anywhere along this coast in depths of 18 to 30 fathoms, especially during the southeast monsoon.

"Valwinden" (sec. 5-63) are, however, frequent.

5-72 Off-lying dangers.—Several detached steep-to dangers lie at a distance of about $1\frac{3}{4}$ miles off the coast between Tanjong Hebri and the entrance to Elat Bay. The channel between these dangers and the coast is deep and clear.

Mituwat, the northernmost of the dangers, is about 1 mile long and three-fourths of a mile wide; it partly dries, but is completely covered at one hour before high water.

Mitduan, located close southward of Mituwat, is about $1\frac{3}{4}$ miles long; it is a rocky shoal that partly uncovers.

A $1\frac{1}{2}$ -fathom shoal lies $2\frac{1}{2}$ miles north-northwestward of Tanjong Jarleier and $1\frac{1}{4}$ miles southward of the southern end of Mitduan.

Abreast Tanjong Jarleier is Mitnaloa, a slightly crescent-shaped reef about 1 mile long. The southern part of this reef is awash at high water; this danger lies in the approach to Elat Bay. A $6\frac{1}{2}$ -fathom shoal lies close northeastward of the northern end of Mitnaloa. A depth of $5\frac{1}{4}$ fathoms has been reported about $\frac{1}{2}$ mile southwestward of the southwest end of Mitnaloa.

5-73 ELAT BAY ($5^{\circ}38' S.$, $132^{\circ}58' E.$)

[REDACTED], located about midway of the western side of Noehoe Tjoet, is a roughly circular inlet with a diameter of about $1\frac{1}{2}$ miles. Close to the eastern side of the bay are two small islets, Nuhu Ru and Krad, connected by a reef that projects from the shore of the bay; farther southward is the larger Sfat Islet, which is surrounded by an extensive reef and is connected with the south shore of the bay by a shore bank. Close off the western entrance point of the bay is the much larger Nuhu Jaan Island, 69 feet high. In the bay itself there are several rocky

patches, but, because of the buoys and beacons that mark them, entrance into the bay is not difficult.

Elat Roads are limited by a line drawn from the northern extremity of Nuhu Jaan through the south point of Krad and a line drawn from the south point of Nuhu Jaan to the extremity of the western entrance point of the bay.

The principal landmarks in this locality are Mt. Warhuk and Mt. Siechek (both described in section 5-62) and a light green hill on Sfat Islet; this hill can be seen for a considerable distance from seaward. There are numerous coconut trees in the vicinity of the bay.

Beacons and buoys.—The dangers in Elat Bay are marked as follows: On the starboard hand, entering, by a white iron beacon; on the port by two black iron beacons.

The white iron beacon, which has a ball top mark, is located in a depth of 9 feet on the reef at the northern end of Nuhu Jaan Island; vessels should clear this beacon by at least 600 yards.

The outer black beacon, which has a truncated conical top mark, is located on a 2-fathom shoal about 740 yards westward of the southern end of Krad Islet; the inner black beacon stands on the western edge of the reef 330 yards westward of the western extremity of Sfat Islet. The outer beacon may be passed at a distance of 50 yards, the inner at a distance of 30 yards.

5-74 Anchorage.—Elat Bay affords anchorage in all seasons of the year. During the southeast monsoon the best anchorage is in a depth of about 14 fathoms, sand, west of the pier at Elat village, at the southern end of the bay. During the northwest monsoon the preferred anchorage is in a depth of 13 to 16 fathoms, sand and coral, westward of Nuru Jaan Island, with Rahorin village,

which lies southwestward of Elat village, bearing about south.

5-75 **Tides.**—At Elat Bay there is both a diurnal and a semidiurnal tide, but the latter predominates. The spring highs and the spring lows of the two tides do not coincide. The highest water level occurs in February or March and August or September, the lowest in December and June; the maximum rise and fall that can be expected are, respectively, about 4.9 feet above and 5.5 feet below mean sea level.

5-76 **Directions.**—Vessels approaching Elat Bay from the north should sight the light green hill on Sfat Islet and steer for it until the beacons and buoys are picked up. Inasmuch as the dangers within the bay are well marked there should be no difficulty in proceeding to either of the anchorages. Attention is called to the distances at which these aids may safely be passed, as set forth in the paragraph "Beacons and buoys" above.

5-77 **ELAT (BANDAN ELAT) VILLAGE (5°39' S., 132°58' E.).** located on the south shore of Elat Bay, is inhabited principally by descendants of the Bandanese, who were driven from Banda in the 17th century by the East India Company. It is the most important village on Noehoe Tjoet and is a center for the exportation of copra.

The large village of Boetoen stands on the east shore of the bay about $\frac{1}{4}$ mile east-southeastward of the southern end of Sfat Islet.

Piers.—A stone pier about 330 yards long projects into a depth of 16 feet from a point close northwestward of Elat village. There is a red-roofed customs shed on this pier. In the shoal water abreast the village there is a disused pier, at the root of which stands a flagstaff.

Supplies of provisions and good drinking water can be obtained at Elat village.

Communications.—Vessels call regularly at Elat Bay. Construction of a post and telegraph office was reported in 1962.

5-78 **Coast.**—The west coast of Noehoe Tjoet between Elat Bay and Werka village, $3\frac{3}{4}$ miles to the south-southwestward, is composed of rocky cliffs that rise sheer from

the sea to a height of about 70 feet. Tanjung Laer Majoran, situated $2\frac{3}{4}$ miles southwestward of the western entrance point of Elat Bay, may be recognized by the waterfall that plunges from a cliff into the sea at the point; water is taken directly into boats that are pulled under the fall. The coast from Werka to Larat village, a distance of $6\frac{1}{2}$ miles, is low and gently sloping. A reef, which breaks, is located $3\frac{1}{2}$ miles northward of Larat and about $1\frac{1}{4}$ miles offshore. Abreast Nerong village, located 5 miles southward of Werka, there is a small inlet that is suitable for small craft. The point at Larat is easily recognized by the Aran Rocks that lie on the reef off it. There are several shoal spots along this stretch of coast.

The coast between Larat and Feer villages trends south-southwestward for a distance of $9\frac{1}{4}$ miles, with several indentations, the largest of which is located $5\frac{1}{2}$ miles from Larat. The most prominent marks along this part of the coast are: A conspicuous white stone located close to the shore $2\frac{1}{4}$ miles from Larat; the picturesque Hoiko village, which stands on the shore of a small inlet whose sides rise almost vertically from the sea; Duvin (Doefin) Islet, located on the shore reef close southwestward of Hoiko; and the rocky Rerean Islet, situated on the reef 4 miles southward of Duvin. This coast is exposed to exceptionally strong "valwinden," (sec. 5-63).

5-79 **Feer (Fer) Roads (5°57' S., 132°50' E.)** consist of an open anchorage located $3\frac{3}{4}$ miles north-northeastward of the southern end of Noehoe Tjoet. On the northern side of the anchorage is a white sandy shore bank that remains dry at all stages of the tide; from this bank a tongue over which there is a least depth of $1\frac{1}{4}$ fathoms extends southward about 675 yards, forming within the shore bank a bight with a width of 430 yards and depths of $5\frac{1}{2}$ to 16 fathoms. Vessels should approach

with the mosque in Feer village bearing between east and southeast and anchor in any depth on that bearing.

Feer (Fer) village is built on two terraces on the slope overlooking the roadstead. The village of Langiar (Langgear), surrounded by coconut trees and containing a conspicuous mosque, is situated on the beach nearly one-half of a mile southward of Feer.

5-80 Tanjung Weduar, the southern extremity of Noehoe Tjoet, consists of gray vertical cliffs about 170 feet high.

5-81 Nerong Strait, the water area between Noehoe Tjoet and the Noehoe Rowa group, is deep and clear and offers no difficulties to navigation. The least width of the strait, 4 miles, is abreast the villages of Abean on Noehoe Efroeans and Hoiko on Noehoe Tjoet. Nothing is known regarding currents in the strait, but it is presumed that they are very weak.

5-82 THE AROE (ARU) ISLANDS located about 65 miles eastward of Noehoe Tjoet and about the same distance southwestward of the nearest coast of New Guinea, are generally low and very uniformly wooded. The group consists of five large islands, separated by very narrow and shallow channels, and numerous smaller islands. The largest islands are Kola, Wokam, Kobraor, Maikoor, and Trangan. The smaller islands are grouped around these five; most of them are connected with the principal islands by reefs, but some are separated by navigable channels. The highest elevations in the group, 292 and 240 feet, are located, respectively, near the southern extremity of Trangan and on Great Karaweira Island, located eastward of the northern end of Kobraor.

The reefs can generally be safely approached on soundings. Since the water in their vicinity is not clear the reefs are generally not marked by discoloration. In fact, it frequently happens that there will be no discoloration even in moderately deep water. Between the reefs there are passages through which small craft can reach the villages, rivers, and channels that separate the principal islands. It is impossible to lay down

a definite limit to the danger zone around these islands, but it is not advisable to approach unnecessarily within the 10-fathom curve.

There is little uniformity in the names given by the natives to the various islands, points, and channels of this group; some places are known by as many as six or seven different names.

These islands are generally very sparsely settled. The native population in general lives on the east side of the principal islands. Although many different tongues and dialects are spoken on the islands, Malayan is generally understood.

Most of the villages on the east coast are built on cliffs and can be reached from the shore only by means of flights of steps. The principal occupations on the islands are agriculture, hunting, fishing, and pearl diving. An Australian firm has a government concession to dive for pearls outside the 5-fathom curve; the area inside that curve is reserved for the natives. Dobo, located on the northern side of Wamar Island on the west side of the group, is the only port of any importance in the Aroe Islands; all trade is concentrated there.

Off-lying Reef.—A reef of indefinite size was reported in 1945 southward of the Aroe Islands. It lies within a 5-mile radius of a position in latitude 8°38'S., longitude 134°26'E. The reef is unexamined.

Out-lying Banks.—A bank with a depth of 13 fathoms was reported (1908) to lie about 36 miles southwestward of Tanjung Ngabordamloe, the southernmost extremity of the Aroe archipelago. A bank with depths of less than 20 fathoms extends south-southeastward for 36 miles from the same point. A depth of 17 fathoms lies close to the south extremity of this bank. Another bank with depths of less than 20 fathoms extends eastward from the east side of the archipelago, but the eastern limit of this bank has not been defined. A least charted depth of 11 fathoms lies about 105 miles east-northeastward of Tanjung Ngabordamloe, in 6°44'30"S., 135°54'00"E. A detached bank with a depth of 16 fathoms lies about 49 miles south-southeastward of this position.

Winds and weather.—See section 1-26.

5-83 The climate of the Aroe Islands is generally healthful except during the first few months of the southeast monsoon, when there are usually epidemics of fever and beriberi.

5-84 **Tides.**—For information concerning tides at Dobo see section 5-97. High water occurs simultaneously on opposite sides of the group of islands in places of the same latitude, but the time of high water becomes progressively later as one goes southward; at the southern end of the group it is 2 hours later than at Dobo. Throughout the Aroe Islands the amount of rise and fall of the tide is about the same as at Dobo.

5-85 **Currents.**—Tidal currents are perceptible at a distance of 15 to 20 miles from the Aroe Islands. In the open sea the flood current sets to the eastward and the ebb to the westward; the maximum drift is about 2 knots. The flood and ebb currents, respectively, become established 1 to 2 hours after high and low water at the shore.

Along the west side of the group the flood current sets southward and the ebb northward, with a maximum drift of 1½ knots. The duration of the ebb current is considerably longer than that of the flood. In the mouths of the narrow channels between the islands there is often a very strong ebb current lasting practically as long as that tide, followed by a weak flood current of only a few hours' duration. The same condition obtains at Dobo Road, except that at that place there is a brief period of slack water.

The flood current sets southeastward and eastward around the southern end of the group; off Tanjong Ngabordamloe, the southern extremity of Trangan Island, this current has a maximum drift of 3 knots.

Along the north side of the group the flood current sets southeast by east at a rate of about 2½ knots as far as the eastern part of the Jeden Islands, where it turns south-southeastward and continues in that direction along the east sides of Wokam and Kobroor Islands to Mariri Island, located about midway of the east side of Kobroor.

At that position it meets the flood current that sets east-northeastward from the southern end of the group. Turning with that current it then sets back northward along the east coast. At the point of junction of these two currents a rotary movement is set up, toward the shore when the tide is rising and away from the shore when it is falling. Northward of the northern end of Penamboelai Island the rotary movement is clockwise; southward of that position it is counterclockwise.

From a position off the northern end of Penamboelai (6°17'S., 134°52'E.) the ebb current sets north-northeastward and northward as far as Konan Island, 44 miles to the northward, where it turns to the north-northwestward; northward of the Jeden Islands its direction is northwest by north. Southward of the northern end of Penamboelai the ebb current follows the line of offshore reefs to the southward; off the entrances to the channels separating the islands this current is deflected to the southeastward and southward.

Off the east coast the direction of the tidal currents is considerably affected by the currents that set through the channels separating the various islands; the currents setting out of these channels exert much more influence on the coastal currents than do those setting into the channels.

Heavy rips, caused by the irregularity of the bottom and giving the impression of the existence of dangerous shoals, have been observed at the height of the tidal currents off the northern and southern ends of the group, particularly along the 7-fathom curve southwestward of South Kultubai and southward of the western extremity of Jeudin Island.

5-86 **North side of the Aroe Islands.**—**Warilaoe** (Warilau), the largest island northward of Kola, is uniformly covered with tall trees; a small village of the same name is situated on the southwestern side of the island. Warilau Island was reported (1961) to be a good radar target up to a distance of 19 miles. Toba, a small islet, from the north, west, and southwest sides of which an ex-

tensive reef projects, lies $1\frac{1}{2}$ miles westward of the western extremity of Warilaoe Island; it is covered with tall trees. Ngoba is a small, crescent-shaped islet lying on the wide reef that extends out from the northwestern side of Warilaoe; the trees that cover this islet are not as tall as those on Toba. A detached reef lies between Ngoba and Toba; there is a small, grass-covered islet on this reef. Another detached reef on which there is a similar grass-covered islet lies 2 miles north-northeastward of Tanjung Watoleidjoering (Watuleijuring), the northern extremity of Warilaoe Island. On the shore bank eastward of Warilaoe and northwestward of the Jedan Island group is a sandbank that covers at high water.

5-87 The Jedan (Djedan) Islands consist of a group of uninhabited islands, the larger of which are low but well-wooded. Jedan, the northeasternmost island of the group, is the most important landmark in this part of the Aroe Islands. The tops of the trees on the east side of this island are about 165 feet high. During the day Jedan Island can be made out from a distance of 13 miles. The reefs on which these islands lie are intersected by several tortuous channels through which the tidal currents run strongly when the reefs begin to uncover. Lutur Island, located $1\frac{1}{4}$ miles southwestward of Jedan, has a small summit that stands slightly above the surrounding foliage. Santigi, consisting of five low, mangrove-covered islets, lies on the reef that extends eastward from Lutur. On an extensive reef southward of Jedan is Surat Islet, a small atoll-shaped sandbank. Belading Island, the largest in the group, lies close westward of Lutur; a narrow channel separates the reefs on which these islands lie.

Southeastward of Warilaoe and southwestward of the Jedan Islands is a group of eight or nine rock islets that are densely covered with vegetation; the southeasternmost of these islets is named Tapoesoer.

A dangerous sunken rock lies about $6\frac{1}{2}$ miles northeastward of Jedan Island outside the 10-fathom curve.

A depth of 3 fathoms was reported (1963) about 5 miles north of Jedan Island.

5-88 Sungi Kola Watu ($5^{\circ}24'S.$, $134^{\circ}28'E.$), a deep channel in which there are no detached dangers, lies between Warilaoe and the north side of Kola, the northernmost of the principal islands of the group. The reefs on either side are generally marked by discolored water. The Tiga Islets are three high, thickly-wooded islets that lie on the south side of this channel close off the shore of Kola Island. Klipklip Watu is a small, unsurveyed channel that leads from the northward close along the southeastern shore of Warilaoe into Sungi Kola Watu. The eastern approach to Sungi Kola Watu is either northward or southward of Tapoesoer, but the latter channel is suitable only for small craft. In the northern channel there are general depths of 5 to 12 fathoms, but there is a $2\frac{1}{4}$ -fathom shoal in mid-channel about 1,600 yards southward of the southeastern end of Belading; the edges of the reefs along this channel are generally marked by discolored water. The channel leads northwestward to a position abreast the western end of Belading and then south-southwestward along the east shore of Lafoesa, an islet located about 1,600 yards westward of Tapoesoer. This part of the channel, in which there is a least midchannel depth of $3\frac{3}{4}$ fathoms, joins Sungi Kola Watu southeastward of Lafoesa.

5-89 West side of the Aroe Islands.— Except for the southern part of Trangan, which is hilly and rises sheer from the sea, the western sides of the Aroe Islands are low and uniformly covered with dense woods. There are no landmarks that can be used to fix the position of a vessel along this coast. The mouths of the various rivers and channels and the more or less protruding sections of the islands are of use to vessels that pass closely along the shore. The 10-fathom and 5-fathom curves are a considerable distance apart, but the 5-fathom and 3-fathom curves are rather close together. Inside the 5-fathom curve there are numerous reefs. The bottom along the coast is regular. Vessels can anchor outside the 5-fathom curve, in

sand, almost anywhere along this coast.

5-90 **Kola Island**, the northernmost of the main islands of the Aroe group, is low and densely wooded. Sungi Kola Watu separates Kola from Warilaoe. The island is intersected by a number of channels and creeks of varying depths. The two largest channels are Sungi Marjina, which opens into the eastern part of Sungi Kola Watu, and Sungi Marlassi, which is entered on the east side of the island. Sungi Sisir Watu, which limits the south side of Kola and separates it from Wokam, is said to be suitable for small craft. Tidal currents rush through the channel with great force. At its western end the channel is narrow and tortuous and has formed a sort of delta on which there are numerous islets and drying flats.

5-91 **Buar Island** ($5^{\circ} 26' S.$, $134^{\circ} 27' E.$) separated from the northwestern extremity of Kola by a narrow channel, is similar to the latter in that it is low and densely wooded. A drying reef extends nearly three-fourths of a mile from the northwestern side of the island. A $1\frac{1}{4}$ -fathom patch about one-half of a mile in diameter lies 2 miles southwestward of the southwestern extremity of the island.

5-92 **Wasir Island**, the northwesternmost of the Aroe Islands, lies about 11 miles west-southwestward of Buar Island. It is rocky and somewhat higher in the northern than in the southern part. Along the west side of the island, which can be approached rather closely, there are four large wooded rocks; the northernmost of these rocks can be recognized at a considerable distance offshore. Java Reef, an $8\frac{3}{4}$ -fathom shoal, lies $3\frac{3}{4}$ miles northward of the northern end of Wasir Island. Wasir Strait, separating Wasir and Oedjir Islands, has general depths of about 10 fathoms, but near midchannel at the northeastern end, there are two extensive shoal spots that make navigation rather difficult. Over the eastern shoal, located 1 mile northwestward of the northern extremity of Oedjir Island, there is a depth of $2\frac{3}{4}$ fathoms; the other shoal, located three-fourths

of a mile westward of the foregoing, has a least depth of 3 fathoms.

Abnormal magnetic variation is reported about 8 miles westward of Wasir Island.

5-93 **Oedjir (Ujir) Island**, located just outside a bight of Wokam Island, about $2\frac{1}{2}$ miles southwestward of Wasir Island, is 7 miles long, northeast and southwest, and $1\frac{1}{4}$ to 3 miles wide. The northern part is higher than the southern. A sandbank that remains dry at all stages of the tide lies on the drying shore reef south-southwestward of Tanjung Tutupano, the western extremity of Oedjir Island. A slip for pearl craft is maintained on an islet off the southeastern side of Oedjir by a local trading company.

5-94 **Wokam Island**.—The west side of Wokam Island, the largest of the Aroe Islands, between the entrance to Sungi Sisir Watu and Sungi Waliramai, 15 miles to the southwestward, is bordered by a reef about three-fourths of a mile wide which dries in places. Sungi Waliramai is shallow; off its mouth lies Lewakai Islet. The shore in the neighborhood of Tanjung Samang, southwestward of Oedjir Island, is rocky in places and light gray in color. Between this point and Tanjung Malakafani, the southwestern extremity of Wokam Island, located $4\frac{1}{2}$ miles to the southward, the coast is fringed by a reef nearly three-fourths of a mile wide. Two or three villages that are nearly concealed by trees are situated on the northern part of this stretch of coast. The channel between Oedjir and Wokam Islands contains numerous dangerous reefs which make passage through it inadvisable. Vessels that do traverse it usually await low water.

5-95 **Wamar Island**, located close southward of the westernmost projection of Wokam Island, is low and thickly wooded and is fringed by a drying bank, except at its northwest extremity where there is a drying reef. On the northeastern extremity of the island is the town of Dobo. On the coast reef just south of Tanjung Ular, the northwestern extremity of the island, are three conspicuous rocks, and on the reef near Tanjung Batu

Dua, the southwestern extremity of the island, there are two similar rocks.

5-96 DOBO HARBOR ($5^{\circ}45' S.$, $134^{\circ}11' E.$) lies between Wokam and Wamar Islands. Tanjong Ular, the southern entrance point of the harbor, is low and rocky. The Wokam shore of the harbor is covered with mangroves in most places. The width of the channel, between the 5-fathom curves, is about 1,300 yards at the western entrance and 600 yards abreast the town of Dobo; the area between these curves and the shores of the islands is occupied principally by broad, drying shore banks. The sandy point on which Dobo stands can be approached closely. The water in the harbor is so muddy that discoloration furnishes no guide for the location of dangers except those that dry at low water. Shoals, some of which dry, lie in the channel about $1\frac{1}{4}$ miles eastward of Dobo.

The least depth in the channel to Dobo is 6 fathoms, located northward of Tanjong Ular. In the anchorage there are depths of 11 to 25 fathoms.

The most prominent landmark in the vicinity of the harbor is the light structure on Tanjong Ular.

Lights.—A light is shown from Tanjong Ular.

A light is occasionally shown from a wooden post on the head of the pier at Dobo.

Beacon.—A white iron beacon with a top mark consisting of a ball over a black screen stands on the shore bank on the southern side of the fairway about $\frac{1}{4}$ mile west-northwestward of Dobo Light.

An iron pile beacon stands near the reef off Tanjong Malakafani, on the northern side of the fairway.

Buoys.—A white conical buoy marks the channel in a position about 1 mile west-northwestward of Dobo Light. An aviation buoy is moored 620 yards $116\frac{1}{2}'$ from the flagstaff at Dobo.

5-97 Tides.—At Dobo there is both a diurnal and a semidiurnal tide, but the latter predominates. The spring highs and the spring lows of the two tides do not coincide.

The highest water level occurs in April or May and October or November, the lowest in December or January and June or July. The maximum rise and fall that can be expected are, respectively, about 3.0 feet above and 3.6 feet below mean sea level.

5-98 Tidal currents.—Off the entrance to Dobo Harbor the flood current sets to the southward, the ebb to the northward. During the southeast monsoon the flood current in the harbor is weak, but the ebb current has a velocity of about $1\frac{1}{2}$ knots and lasts longer than the flood. At the anchorage off Dobo the ebb current sometimes attains a much greater velocity than that given above.

5-99 Directions.—Vessels approaching Dobo Harbor from the west sight four openings in the land; the third from the north is the entrance to the harbor. The course for entering the harbor is marked by the flagstaff at Dobo and the beacon that stands on the bank about 1 mile west-northwestward of the town in range bearing 116° ; in the event that the flagstaff cannot be made out, the beacon may be brought in range with the center of a large black shed with a tin roof, the northwesternmost building at Dobo, on the same bearing. Continue on that range until the light structure on Tanjong Ular bears 220° and then change course to 101° . When Tanjong Fanajuring, a point of Wokam Island located 6 miles east-southeastward of Dobo, is seen midway between Dobo and Tanjong Merukujuring, located about $1\frac{1}{4}$ miles eastward of Dobo, bearing 115° , proceed along that range line to the anchorage.

5-100 DOBO.—The town of Dobo ($5^{\circ}45' S.$, $134^{\circ}13' E.$), located on a small sandy point on the north side of Wamar Island $2\frac{1}{4}$ miles within the western entrance to the harbor, is the only place of any consequence in the Aroe Islands. A port doctor is stationed at Dobo. There is a small hospital.

Pier.—A pier 110 yards long, used for local trading craft, extends in a northeasterly direction from the shore close northeastward of the flagstaff. There is a depth of 9 feet at the head of the pier.

Supplies.—Limited quantities of provisions are obtainable.

5-101 Coast.—Between Tanjong Malakafani, the western extremity of Wokam Island, and Tanjong Fatujuring ($6^{\circ}00' S.$, $134^{\circ}08' E.$), the north-

western extremity of Maikoor Island, the irregular coast forms a roughly rectangular bay about 17 miles long and 8 to 10 miles wide, in the northwestern corner of which is Wamar Island, described above. The entrance to the unimportant Sungi Toengoe-watoe lies at the northeastern corner of this bay, and the entrances to Sungi Wonumbai and Sungi Workai are near the southeastern corner. The eastern shore of the bay northward of Sungi Wonumbai is irregular in outline, with numerous points and bights; between Sungi Wonumbai and Sungi Workai the coast is rocky, with several small islets close off it near the entrances to these channels. The southern shore of the bay is somewhat higher and has rocky points in places; between Tanjong Meijuring, located about midway of the southern shore, and Tanjong Fatujuring there is a small, unimportant bay partly closed by a reef, over which there is a depth of 6 feet.

Meirang and Lomar are two islets situated in the northern part of the bay close off the Wokam Island shore and 3½ to 4¾ miles east-southeastward of Tanjong Karkeli, the southeastern extremity of Wamar Island. Babi Island, located on the west side of the bay, midway between Wamar Island and Tanjong Fatujuring, is low but covered with high trees; it is easily recognized by three rocks that lie on the shore reef close off the southwestern extremity of the island.

In the northern part of the bay there are so many dangers that navigation can be carried on only with local knowledge.

5-102 Sungi Manoembai (Wonumbai) is the most important of the channels through the Aroe Islands. It is about 28 miles long and has a least depth of 3 fathoms. Since the eastern part of the channel has not been surveyed, local knowledge is necessary for its navigation.

The flood tidal currents set into the channel at both the east and the west ends and the ebb currents set outward. The maximum velocity of the currents through the mouths of the channel is 1½ to 2½ knots.

Approaches—dangers—channel.—In the approach to the west entrance of Sungi Manoembai there is a bank with a least depth of 2½-fathoms, but there is a channel northward and eastward with a least depth of 3¼ fathoms, leading to the entrance. A drying reef, which extends southwestward from Tanjong Belingaratoe, the north entrance point of Sungi Manoembai, should be given a good berth. The village of Manoembai, located on the south side of the entrance, off which there is a rock covered with light green vegetation, is a good mark and can be passed close-aboard. A conspicuous white rocky patch lies close eastward of the village. The shore is rock-bound within this vicinity. About 3 miles eastward of the village there is a bight on the south side. Two islets within this bight are thickly covered with vegetation.

5-103 Directions.—A vessel, after entering, should steer a midchannel course as far as the above-described bight, thence the best water, from 5 to 5½-fathoms are close to the north shore, until past the mouth of Sungi Marirrehaar, located about 4 miles eastward of the village. Elsewhere, except in the entrance, the depths are over 5½ fathoms, and the channel is clear of dangers. A waterfall will be seen on the north shore, about 3 miles farther eastward, after passing the entrance of Sungi Marirrehaar. Near the entrance of Sungi Api Api, on the south shore, about 4 miles eastward of Sungi Marirrehaar, there is a noticeable hillock. There is another hillock, covered with vegetation and with a conspicuous tree on it, on a point on the south shore, located close westward of the position where the river trends eastward for a short distance. Rocks lie close to both shores in places.

About 1½ miles westward of the mouth of Sungi Dosi, in which there are some islets, lying about 9 miles east-northeastward of Sungi Api Api, there is a drying rock which must be passed on its north side. When beyond the mouth of Sungi Feraun, on the north shore, about 2 miles east-northeastward of Sungi Desi, this shore should be hugged, but subsequently the south shore

BANDA SEA AND ADJACENT ISLANDS

should be closed by crossing between drying mudbanks in a least depth of 3 fathoms.

Several dangers with depths of less than 4 feet lie, within a $3\frac{1}{2}$ mile radius southwestward, westward, and northwestward, respectively, of Tanjong Toardefete. The position of these dangers is best shown on the chart.

5-104 **Sungi Workai** ($6^{\circ}03' S.$, $134^{\circ}15' E.$ [REDACTED]), which separates Ko-broor and Maikoor Islands, can be used only by small vessels. Those of moderate size can proceed up the channel about 5 miles to Njamuk Island. In approaching the western entrance to this channel proceed as directed for vessels bound for Sungi Wonumbai until past the drying reef eastward of Tanjong Meijuring and then steer a south-southeasterly course on soundings for the entrance to the channel.

5-105 **Anchorage.**—Anchorage can be obtained in 11 fathoms in the bay about 1 mile eastward of Tanjong Fatujuring. The anchorage is eastward of a jetty that is located on the western side of the bay. Enter the bay with the eastern end of Babi Island bearing 000° astern and a rock at the head of the bay bearing 180° ahead. When the white house on the jetty bears 258° steer for it on that bearing, and anchor when Tanjong Fatujuring bears 323° . A reef marked by an unofficial **beacon** lies off the western side of the bay in a position about 1 mile south-southeastward of Tanjong Fatujuring. A 2-fathom shoal lies about $1\frac{1}{2}$ miles northwestward of Tanjong Fatujuring.

5-106 **Maikoor (Maikur) Island**, long and narrow, is limited on the northeast by Sungi Workai and on the southwest by Sungi Mai-

koor; the island is flat and thickly wooded. The west coast of the island, between Tanjong Fatujuring and the entrance to Sungi Maikoor, is fronted by a narrow sandy beach. Sungi Beleloide, an unimportant stream that discharges into the sea at a position 4 miles southward of Tanjong Fatujuring, dries at low water; depths of 3 fathoms prevail over a bank that extends out from the mouth of the stream.

A 5-fathom shoal lies $3\frac{1}{2}$ miles southwestward of Tanjong Ratu, which is located $3\frac{1}{4}$ miles southwestward of Tanjong Fatujuring, and an elongated $3\frac{3}{4}$ -fathom shoal lies on the northern side of the approach to Sungi Maikoor, 2 miles offshore.

5-107 **Sungi Maikoor (Maikur)** has a broad, deep entrance and can be safely navigated on soundings at least as far as Taberfane village, located $2\frac{1}{2}$ miles east-southeastward of Tanjong Ngoni, the southern entrance point of the channel; vessels occasionally call at this village. A large and very steep rock which uncovers at low water springs lies in midchannel abreast Taberfane village. Although this channel is said to be deep all the way to the eastern side of the islands, it is reported to be very narrow in places. On the north side of the western part of the channel there are several villages, among which are Maikoor (Maikur), Djaraoekin, and Wangal; none of these is important.

5-108 **Trangan** is the southernmost of the large islands of the Aroe group. The western side of this island is low, and from its projects a relatively wide bank of soundings on which there are irregular depths.

The northern part of this coast is wooded. Between Tanjung Ngoni and the entrance to Sungi Serwatu are the mouths of three small rivers, Sungis Hakmar, Lutur, and Rebi. Off the mouth of Sungi Hakmar the 3-fathom curve lies 3 miles offshore. On the shore reef just northward of the mouth of Sungi Rebi are two small islets, which are seen clear of the land from vessels coming from the southward, but are hard to make out from the northward.

5-109 OFF-LYING DANGERS.—Batavia Reefs ($6^{\circ} 19' S.$, $134^{\circ} 00' E.$, H. O. Chart 3027), located $10 \frac{1}{2}$ miles south-southwestward of the entrance to Sungi Maikoor and about $4 \frac{1}{2}$ miles offshore, consist of a number of shoals with depths varying from $2 \frac{1}{2}$ to $3 \frac{3}{4}$ fathoms. These shoals can not be distinguished by the color of the water over them. Tanjung Ngoni bearing 024° leads westward of these reefs.

There are several 5- to $5 \frac{1}{2}$ -fathom shoals westward and southwestward of the entrance to Sungi Serwatu. The outermost of these shoals lies $6 \frac{1}{2}$ miles offshore. Soundings give warning of approach to the shoals.

5-110 SUNGI SERWATU, which divides Trangan Island into two parts, has been surveyed only as far as the mouth of Sungi Lalur (Laloor), a small tributary, $7 \frac{1}{4}$ miles inland from the western entrance to the channel. This entrance is 1 mile wide, but it is fronted by a large bank over which there are depths of 1 to 18 feet. A channel with a width of about 400 yards and a least depth of $2 \frac{3}{4}$ fathoms leads over this bank. The monsoons are reported to cause this channel to shift. Inside the bar the channel is wider and deeper, but entering vessels should favor the western shore in order to avoid a drying reef that projects from the shore opposite Tanjung Berehi. The shores consist alternately of limestone rocks and low, mangrove-covered land. Sungi Serwatu affords sheltered anchorage for small craft.

5-111 COAST.—The west coast of Trangan southward of the entrance to Sungi Serwatu as far as Ngaibor village, 16 miles to the southward, continues low, with a sandy beach about 100 yards in width and a wide bank of irregular soundings off it. The coast is backed by gently sloping land that is covered with tall grass and shrubs.

Ngaibor, the largest village on the western side of Trangan, is inhabited by Christians. The village, located on a small plateau, is a good landmark. Sungi Ngaibor, the largest fresh-water river in the Aroe Islands, discharges into the sea about three-fourths of a mile northward of the village. During the rainy season the river overflows its banks and is fresh almost to its mouth, which is about 75 yards wide.

The coast southward of Ngaibor is low but rocky as far as Tanjung Lelar, the southwestern extremity of the Aroe Islands, located $4 \frac{1}{4}$ miles to the west-southwestward. From this point to Tanjung Ngabordamloe, the southern extremity of Trangan, the coast is rocky and somewhat higher than that to the northward; since it rises steeply from the sea the points along it are rather easily recognized. Among the landmarks along this stretch of coast are the mouth of Sungi Tafermaar and Bain Hill, which, although 292 feet high, rises but slightly above the other land in the vicinity.

Tanjung Bain serves as a good radar target from a distance of 25 miles.

5-112 SHOALS—CAUTION.—On the bank of soundings between the entrance to Sungi Serwatu and Tanjung Ngabordamloe there are numerous shoals with depths of $1 \frac{1}{4}$ to 6 fathoms. For this reason caution must be exercised by vessels proceeding inside the 10-fathom curve. Soundings should be taken carefully, for they give fair indication of approach to the shoal areas. Attention is directed to the existence of a $3 \frac{1}{4}$ -fathom shoal located about $2 \frac{1}{2}$ miles west-southwestward of Tanjung Bain, midway between that point and a large 2-fathom shoal off

the southeastern end of Blackburn Bank; this shoal lies directly in the path of vessels coming from the northward and proceeding inshore of Blackburn Bank.

The strong tidal currents, especially those during the ebb, further add to the difficulty of inshore navigation along the west and southwest coasts of Trangan Island, because of the unpredictable manner in which they change direction among the shoals and reefs.

A 5-fathom shoal, 200 yards in extent, lies about 38 miles westward of Trangan.

5-113 TANJONG NGABORDAMLOE (Ngabordamlu) (6° 57' S., 134° 11' E., H. O. Chart 3027), located 13 1/4 miles southeastward of Tanjong Lelar, is a relatively low rocky point at the southern end of Trangan Island. On the drying reef that extends southeastward from it is a small islet of the same height as the point. Batu Goyang (Batoe Gojang), a large bare, gray rock 33 feet high, lies on the shore bank three-fourths of a mile southward of the point; close eastward of this rock is a rock awash. A 1 1/4-fathom shoal lies three-fourths of a mile southeastward of Batu Goyang. There are several other shoals on the bank around Tanjong Ngabordamlue. Over the irregular depths on the bank of soundings in the vicinity of this point there are usually strong cross currents and rips and heavy seas.

Tanjong Ngabordamlue gives a good radar return from a distance of 23 miles.

5-114 BLACKBURN BANK, located about 8 miles off the southwestern extremity of Trangan Island, consists of a number of detached shoals, over which there are depths of 1 1/4 to 3 3/4 fathoms and between which there is relatively deep water; the shoaler parts of these patches occasionally break. The bank extends, within the 5-fathom curve, for a distance of about 5 3/4 miles in a northwest-southeast direction. An extensive 2-fathom shoal lies about 3 miles eastward of the southeastern end of the bank. There

are other shoals between this one and Tanjong Ngabordamlue, and several 5-fathom patches lie 4 to 8 miles southward of the shoalest part of Blackburn Bank. For further information regarding the size, location, and configuration of these numerous shoal areas, see the chart.

Inasmuch as the southwest coast of Trangan has few landmarks and is frequently obscured, no marks can be given for clearing these numerous off-lying dangers. The tidal currents are very strong and erratic in the vicinity of the bank and of the numerous shoals in this area; it is also quite probable that these currents cause the shoals to shift considerably. For the foregoing reasons vessels should give the bank and the adjacent shoal areas a wide berth.

5-115 EAST SIDE OF THE AROE ISLANDS.—The eastern sides of the principal islands of the Aroe group are fronted by numerous islands that are connected with the five large islands by a broad coastal reef. These off-lying islands have the appearance from seaward of a monotonously uniform stretch of land; the various islands are difficult to distinguish. Great Karaweira Island, the highest of these off-lying islands, located 6 1/2 miles eastward of the southeastern corner of Wokam Island, can, however, be recognized at a distance of 20 miles by those who are locally acquainted. In view of the strong currents along the coast, it is advisable to remain outside the 10-fathom curve.

Warilaoe, Jedan, and the other islands and the channels through those islands northward of Kola have been described in sections 5-86 and 5-87.

5-116 THE EAST SIDE OF KOLA ISLAND is rocky but thickly wooded. On this coast are Marlassi village, located about one-half of a mile south of Sungi Marlassi, and Masi-dan, built on a rock near Leitin Point 2 3/4

miles southeastward of Marlassi; from seaward these villages have the appearance of light red spots. Off Kuler Island, as well as the islets to the southward, there is a wide reef which prevents vessels from approaching closer than 6 miles unless through one of the narrow channels that cut through the reef. On the reef in many places there are small clumps of trees and some islets such as Binaar, located northward of the eastern entrance to Sungi Sisir Watu. The most important mark on the east side of Kola Island consists of two trees (reported in 1894 to be visible for about 14 miles), located close together at a distance of about $1\frac{3}{4}$ miles southward of Leitin Point; they are considerably taller than the other trees in the neighborhood.

5-117 **Konan Island** ($5^{\circ}34' S.$, $134^{\circ}46' E.$, *H. O. Chart 3027*), located $5\frac{1}{2}$ miles southeastward of Leitin Point, is an uninhabited, sandy, heavily wooded, atoll-shaped islet, of which the highest point is the top of a small tree on the northwestern side. It lies on the southeastern part of a large reef about $4\frac{1}{2}$ miles long. On the reef close off the southern and northern ends of the islet are two rocks. On a clear day Konan can be seen for 13 miles, at which distance it appears as two small trees showing above the horizon.

5-118 **Arar Kula**, located on an extensive reef 2 miles southward of Konan, is a coral and mud bank, part of which remains dry at all stages of the tide. There are a few small isolated trees on this bank. The reef on which Arar Kula stands is separated from the one extending southward of Kola by a narrow winding channel, and from Wokam Island by a rather wide channel in which there are depths of $3\frac{1}{4}$ to $4\frac{1}{4}$ fathoms; the southern entrance to the latter channel, however, is foul. The channels northward and southward of Arar Kula are used by small

craft proceeding to Sungi Sisir Watu, which has been described in section 5-90.

5-119 The east coast of Wokam, like that of Kola, is thickly wooded and rocky. Of the several villages along this coast, the most important is Moha, lying westward of Arar Kula. These villages are similar to the others on the coast in that they are built on rocks and appear from seaward as red patches.

A projecting point 1 mile southward of Tanjung Komfane can be seen from a considerable distance north or south; owing to the gaps in the trees on the point, it appears as several separate islands. On the point is a group of high trees, the tallest of which has a conspicuous hammer-shaped top and can be seen from the eastward or southeastward for a distance of 15 miles. Southward of this point is a wooded islet and two islands named Wodinhun and Wahalaulau, likewise thickly wooded. Beyond these islands the coast turns westward and southward and offers no more recognizable points.

The remainder of the eastern coast of Wokam is divided by numerous rivers into several islands, of which the principal are Aranlau and Sewer. Most of this section of the coast is obscured from seaward by the off-lying Watoelai and Jursian Islands. Westward of Tabar Island the coast forms a small bay in which there are several islets and into which a number of streams empty. The entrance to the Jarangjin, which forms the western boundary of Aranlau Island, may be recognized by a light-colored islet in front of it. On Sewer Island there is a village of the same name. The southeastern point of Sewer is named Tanjung Lingajuring.

Shoals.—A $1\frac{3}{4}$ -fathom shoal lies $3\frac{3}{4}$ miles eastward of Arar Kula, and a $2\frac{3}{4}$ -fathom shoal is located $5\frac{1}{2}$ miles eastward of Wodinhun Island.

5-120 **Watoelai (Watulei) Islands.**—This

group consists of a large number of rocky islands located on a very extensive reef through which only a few narrow, but more or less deep, channels give access to the villages on these islands and along the coast. Jursian and the islets near it may be considered as belonging to the Watoelai group. Aduar, Kumul, Watoelai, and Jursian are inhabited.

5-121 **Rewan** ($5^{\circ}43' S.$, $134^{\circ}48' E.$, *H. O. Chart 3027*), the northernmost of the group, consists of three small wooded islets located close together; the southwesternmost is the highest, the other two are nothing more than wooded rocks. These islets are difficult to make out until they are open of Aduar and Manien. Southwestward of Rewan there is another large rock.

5-122 **Manien** is thickly wooded and may be seen from the northward for a distance of 17 miles. The west side, which is rocky and higher than the rest of the islet, looks like a point when seen from the northward. On the east side there is a sandy beach.

5-123 **Aduar**, the highest and largest of the Watoelai Islands, is covered with tall trees. A small wooded hill is located on the south side of the island. On the island there are several rather large villages; a narrow channel in which there is a depth of about $9\frac{1}{2}$ feet gives access to the villages of this island. Ilmamui Island, located close southward of Aduar, is lower than that island but is thickly wooded. Ngoab Islet, located about three-fourths of a mile southeastward of Ilmamui, is rocky and covered with low trees; two isolated coconut palm trees on the islet make it conspicuous.

5-124 **Kumul Island**, $1\frac{1}{2}$ miles southward of Aduar, is thickly wooded and has a slight elevation in its center. The southeastern extremity of the island is a narrow rocky tongue of land that has on it a remarkable bare spot, on the north side of which there is a small clump of coconut

trees. Kumul village, located on the southeastern side of the island, is reached by means of a passage through the reef; there is a flagstaff at the village. Mangan Island and some small islets are located close southwestward of Kumul.

5-125 **Watoelai (Watulei) Island**, about 1 mile in extent, has a bare patch on its northern point similar to that on Kumul. The village, at which there is a flagstaff, is located on the eastern side of the island. Northwestward of the village is a conspicuous clump of trees about 150 feet high, which forms a mark for the navigation of the channel through the reef to Kumul and Watoelai villages. The northern point of the island can be approached by small vessels at low water.

5-126 **Tabar Island** ($5^{\circ}49' S.$, $134^{\circ}46' E.$, *H. O. Chart 3027*), thickly wooded and flat, is separated from the western side of Watoelai Island by a narrow channel. Elel, Menlau, and Mentai, lying on an extensive reef southeastward of Watoelai, are rocky islets covered with vegetation. Near a village on the northeastern point of Menlau is a group of coconut trees; this village is hard to make out from seaward. The trees on Mentai, which is located nearly $1\frac{1}{4}$ miles within the edge of the reef, gives the island the appearance of a plume. Ramjé, Waria, and some other rocky and wooded islets partly close the entrance to the bay westward of Tabar. On the northeastern point of Waria is an extensive village, visible from seaward and reached by a winding channel that leads through the reef southward of Mentai.

5-127 **Jursian** comprises several rocky, wooded islands in which there are a number of small inlets; these islands lie close off the coast of Wokam. Only the northern point of Jursian Island can be seen from seaward; it may be recognized by Jursian village, which is built on a rock nearby.

Various other small islands lie off the north part of Jursian. Kumir Islet lies eastward, Ngawab Island northward, Matutui westward, and Maria Island southwestward of Jursian; for other islands in the vicinity, see the chart.

5-128 Channel to Kumul and Watoelai.—At about $2\frac{1}{2}$ miles northeastward to Watoelai is the entrance to a narrow but fairly deep channel which leads southwestward and westward toward Kumul and Watoelai villages. The outer edge of the reef can be approached safely by the lead. The best anchorage off the mouth of the channel is in a depth of about $3\frac{3}{4}$ fathoms with the northern point of Kumul in range with Ngoab, and the western of the two small Maar Islets, located westward of Great Karaweira, in range with the eastern extremity of Menlau. Beyond the anchorage mentioned above, local knowledge is necessary for navigating the channel. The channel is only about 150 yards wide in places, and has a least depth of 14 feet. The ebb current runs outward with great strength at springs.

5-129 Karaweira Islands.—This group, consisting of 13 islands, may be divided into two parts, the Karaweira-Watoelai and the Karaweira-Mariri. To the former belong Great Karaweira and Sabir, both on a reef that dries; the Karaweira-Mariri lie 2 miles southward. The southernmost island of this latter section is called Dorlau, but the others have no names. All of these islands are uninhabited and unhealthful.

5-130 Great Karaweira ($5^{\circ}57' S.$, $134^{\circ}50' E.$), the highest land on the eastern side of the Aroe Islands, is visible for a distance of 20 miles. It is rocky, thickly wooded, and has several large rocks close to the shore. The highest tree in the middle of the island is 240 feet above the sea, and, having a top like a cross, is very conspicuous when seen from the eastward to the northeastward. Sabir Islet, located

near the edge of the reef three-fourths of a mile eastward of Great Karaweira, is small and lower than that island; since it is nearly divided by a depression it appears from some directions as two islets. Near the southeastern point of the islet is a rock above water which from the northeastward has the appearance of a lion lying down. The reef on which both islands are situated, and which extends to the Maar Islets on the west, projects $3\frac{1}{2}$ miles northward from Great Karaweira, and has on it some sandbanks that dry at half tide.

5-131 The islands of the Karaweira-Mariri group extend north and south over a distance of $4\frac{1}{2}$ miles; Dorlau, the southernmost island, is covered with vegetation, and has two high trees on it. Eastward of the reef of Karaweira-Mariri is a black coral patch that dries at low water; the center of this patch lies $2\frac{1}{2}$ miles from the eastern edge of the reef. The reef, which extends southward 2 miles from Dorlau, had, in 1894, four solitary trees on it.

5-132 Maar Islets, two in number, are small and rocky; the western islet is the higher. They lie $3\frac{1}{4}$ miles westward of Great Karaweira. The eastern islet when seen from the northeastward appears as two, but the parts are connected by a natural bridge of stone.

Reef.—Eastward of the reef of Great Karaweira, and separated from it by a channel in which the depths range from $2\frac{3}{4}$ to 5 fathoms, is a reef 8 miles long north and south, $2\frac{1}{2}$ miles wide at the south end, abreast Great Karaweira, and tapering to a point at the northern end, with depths of $1\frac{1}{2}$ to $2\frac{3}{4}$ fathoms; off the southeastern part is a small detached $1\frac{1}{4}$ -fathom patch. The outer edge of the reef lies $4\frac{3}{4}$ miles northeastward and 4 miles eastward of Great Karaweira, and its northern extremity is 4 miles eastward of Watoelai Island; it may be approached by the lead.

5-133 Batu Kapal, situated about $2\frac{1}{2}$ miles south-southwestward of Dorlau and 4 miles off the coast of Kobroor, is a high, partly wooded rock which, when open of the Kobroor coast, is a good mark. It is considered sacred by the natives and is, therefore, used for sacrificial services. The channel northward and eastward of this rock is foul; a $2\frac{3}{4}$ -fathom patch lies 1,600 yards southwestward of the rock. At 3 miles south-southeastward of Dorlau is a reef, about 2 miles long east and west and 1 mile wide, on which there is a small sandbank that remains dry at high water.

5-134 **Channels to Sungi Wonumbai.**—Small local craft bound for Sungi Wonumbai usually take the channel that leads northward and westward of the reef on which Great Karaweira is located, past the Maar Islets, and thence in a southwesterly direction to the channel entrance. Another approach leads either northward or southward of the drying reef south-southeastward of Dorlau, southward of Batu Kapal, and thence to the channel. There is good anchorage southward of Batu Kapal. Sungi Wonumbai has been described in section 5-102.

5-135 **Mariri Islands.**—This group consists of Mariri and Leer and several smaller islands, of which Lola is the southernmost and most important; they lie at a distance of about 5 miles off the coast of Kobroor along a north-northeast and south-southwest line, and are in great part overgrown with coconut trees. The space between these islands and Kobroor is almost entirely occupied by sandbanks and reefs. There are often heavy tide rips on the shoals between the Karaweira and Mariri Islands. On the northern side of Mariri, the northern islands, there are two coconut trees, about 165 feet high, which can be seen for a distance of 15 miles. Off the northern end of Mariri are two rocks. Two rocks also lie off the southeastern point of the island; on one of the

latter is the village of Mariri, which can easily be seen from seaward. From Mariri the reef extends about 1 mile westward and northwestward with two high sandbanks on it. On the eastern side of the island the edge of the reef is comparatively close to the shore and the soundings decrease gradually from seaward. Anchorage can be taken with the village of Mariri bearing 264° , in $3\frac{3}{4}$ fathoms, about $\frac{1}{4}$ mile offshore. On the reef northeastward of Leer Island lie Wadijili and Seja Islets, the former of which is in two parts. This reef is separated from the reef of Mariri by a channel in which the depth is $2\frac{1}{4}$ fathoms.

5-136 **Leer Island** ($6^{\circ}12'S.$, $134^{\circ}51'E.$), located $1\frac{1}{2}$ miles southward of Mariri, is heavily wooded and may be recognized by its many dead trees. Vessels coming from the southeastward sight Leer and the highest point of Mariri at the same time. Five small rocky islets lie on the reef off the southern point of Leer. On Lola, the southernmost and largest of these islets, is a village of the same name, and on the point of the island just southward of the village is a clump of coconut trees. Lola is surrounded on the east and south by a reef with $2\frac{1}{2}$ fathoms least water. Small vessels can approach the village to within about 200 yards.

Epar, situated on a separate reef westward of Leer, is rocky and overgrown and consists of two islets which appear as one from seaward.

5-137 **Eastern coast of Kobroor.**—From Tanjung Balatanjuring, the northeastern point of Kobroor, the coast trends northwestward, forming the southern bank of the Sungi Wonumbai. From the same point it stretches southward and southwestward for about 20 miles to the southeastern point of the island. Laklakar Island, located $1\frac{1}{4}$ miles southeastward of Tanjung Balatanjuring,

ing, is rocky, wooded, and surrounded by seven detached rocks that are covered with vegetation. About 3 miles southward of Laklakar is the mouth of Sungi Warloi; in the entrance to this channel lies Leliling Island on the east side of which is Warloi village. Northward of the village is a tree with a conspicuous white bare trunk. On the coast of Kobroor are several villages; Kobroor village lies at the mouth of a river of the same name, and Pono is situated on the rocky southeastern extremity of the island at the entrance to Sungi Workai. The coast reef extends in some places 2 miles out, but has not been fully examined; on it are Waria, Kokwana, and Kuling Islets, and two rocks.

5-138 **Penamboelai, Barakan, and Workai (Barkai)** are three relatively large islands that lie eastward, respectively, of the southeastern part of Kobroor, the east side of Mai-koor, and the northeastern part of Trangan. With the exception of some places where the coast is rocky, these three islands are low but covered with high trees. Since the area westward of the outer string of islands has not yet been surveyed, little is known about Mimien, Kul Mimien, Lelamtuti, Wolvat, and Baun, all located between these three off-lying islands and the shores of the three main islands mentioned above.

Among the landmarks on the east side of Penamboelai are: Tanjong Uafu Fenjuring, a conspicuous point with high trees and a sandy beach, located $2\frac{1}{4}$ miles southeastward of the northern end of the island; a clump of trees about 165 feet high just north of Rabal village, about 3 miles southward of the above point; and a conspicuous tree with a bare straight trunk and a thick top on Tanjong Ki, 5 miles south-southwestward of Rabal village.

The rocky northeastern point of Barakan Island is a good landmark that may be seen for a distance of 14 miles. About midway

of the west side of the island the trees are conspicuously higher than they are elsewhere on Barakan.

On the extensive steep-to reef which surrounds Workai Island there are a number of small islands. One of these, Turtur Juring ($6^{\circ}38' S.$, $134^{\circ}45' E.$, *H. O. Chart 3027*) separated from the northeastern part of Workai by a very narrow drying channel, is thickly wooded and rather high; the east point of this island is somewhat higher than the land back of it, and for that reason looks like a small hill when seen from the northward. On this reef, about 3 miles southward of the eastern extremity of Turtur Juring, are the North Kultubai Islets, three low, wooded, atoll-shaped, sandy islets of which the easternmost is the largest; these islets are easily recognized from the northward, but from the southward they merge with the higher Turtur Juring. Between these islets and Turtur Juring, about three-fourths of a mile southward of the latter, is a sandbank, part of which remains dry at all stages of the tide.

Between North Kultubai and the reef northward of the Djin Islands there is an opening 3 miles wide that penetrates westward for a distance of 5 miles into the reefs. Depths of not less than 4 fathoms will be found in the eastern part of the opening in an area limited on the north and south, respectively, by a line drawn in a 069° and an 083° direction from a coconut palm tree near Longar village at the southern end of Barkai, and on the west by an extension of the line connecting the eastern extremity of Turtur Juring and the western group of trees on North Kultubai. The bottom here is of sand and mud.

5-139 **Approach to Sungi Workai.**—Between Lola, the southernmost of the Mariri Islands, and the northern end of Penamboelai there is a channel with general depths of 5 fathoms, but in which there are a few patches of 3 fathoms. Westward of Penam-

boelai this channel trends southwestward between the eastern coast of Kobroor and Mimien Island to the entrance to Sungi Workai. There are no known marks to aid in the navigation of this channel. Vessels use the channel to reach Lola village.

From seaward steer 210° for the sandy eastern point of Sungi Kangurma, at the northern end of Penamboelai, until the southwestern point of Mariri is in range with Seja Islet and Jarang Islet is open southward of Lola; then steer 242° until Epar Islet is open westward of Lola, and then alter course to 269° . When Lola bears 048° steer 228° toward the entrance to Sungi Workai along the line of soundings shown on the chart. There is a 3-fathom patch in midchannel about 5 miles southwestward of Lola. Vessels can anchor 2 miles southward of Lola in $5\frac{1}{2}$ to 6 fathoms, mud, sand, and coral. The flood current at the entrance is reported to set southward and the ebb eastward. At the anchorage off Lola the ebb current sometimes attains a rate of $2\frac{1}{2}$ to 3 knots.

5-140 Sungi Workai is one of the channels connecting the east and west coasts of the Aroe Islands. It is used, however, only by small craft with local knowledge. The eastern entrance to the channel lies about 11 miles westward of the southwestern side of Penamboelai Island.

5-141 The southeastern side of the Aroe Islands.—The Djin (Jin) Islands, located on the southern edge of an extensive reef that almost touches the southern end of Workai Island, consist of six low sandy islands that are sparsely populated.

5-142 South Kultubai ($6^{\circ}52' S.$, $134^{\circ}42' E.$, *H. O. Chart 3027*), the easternmost of the Djin Islands, is wooded, but there is a gap in the woods that makes the island appear as two when seen from the southward. Two conspicuous trees stand close together near the west extremity of the island; these trees are not visible on the bearings 203° through

west to 338° . There are shrubs on the reef northward of this island.

5-143 Maarjinjin, located close westward of South Kultubai with the narrow Wadin Islet between, has on its south side a tree with a V-shaped top.

5-144 Jeudin Island, the westernmost and largest of the Djin Islands, is covered with trees of which the highest are on the east side of the island. On the southeast side of the island at a distance of 2 miles within the east point there is a tall tree with a top that, from the southward, has the appearance of a church with a steeple. A reef, near the outer edge of which there is a dry sandy cay, projects three-fourths of a mile southward from the southwestern extremity of the island. Anchorage may be taken during the southeast monsoon in a depth of 9 fathoms off the west end of the island. In the vicinity of this anchorage the flood tidal currents set northward at a rate of $1\frac{3}{4}$ knots, the ebb currents set southward at a rate of 2 knots.

Shoals.—A $2\frac{3}{4}$ -fathom rocky shoal lies near the 5-fathom curve about $3\frac{1}{2}$ miles south-southwestward of the conspicuous tree on the southern side of Maarjinjin Island, and a $1\frac{3}{4}$ -fathom shoal lies $6\frac{1}{2}$ miles southwestward of the western extremity of South Kultubai Island and $3\frac{3}{4}$ miles northeastward of the northern extremity of Karang.

5-145 Mar and Jeh Islands, located, respectively, $2\frac{3}{4}$ and 5 miles southwestward of the western end of Jeudin Island, are low and uninhabited. On the southeastern part of Jeh there are a few isolated trees, but the rest of that island, as well as the whole of Mar Island, is heavily wooded. A narrow but clear channel in which there is a least depth of $3\frac{3}{4}$ fathoms separates the two islands; tidal currents are very strong in this channel. Mar is located near the southeastern end of a very extensive drying reef.

5-146 Fenjuring (Pendjoering) Island,

lying on the broad reef northward of Mar and between Workai and Trangan, consists of a number of small heavily wooded islets that appear as one island. Between the reef and Trangan there is a deep channel that gives access to Old Krei and New Krei villages, both situated on the shore of Trangan.

5-147 **Enoe (Enu) Island** ($7^{\circ}05' S.$, $134^{\circ}29' E.$, *H. O. Chart 3027*), located $18\frac{1}{2}$ miles east-southeastward of Tanjong Ngabordamloe, the southern extremity of Trangan Island, is the southernmost island of the Aroe group. It is low and uninhabited and is surrounded by a narrow coral reef. A $2\frac{3}{4}$ -fathom shoal is located $2\frac{1}{2}$ miles south-southwestward of the western extremity of the island.

5-148 **Karang**, located $8\frac{1}{2}$ miles east-northeastward of Enoe and the same distance south-southwestward of the western end of South Kultubai, is a low wooded island that is surrounded by a coral reef. Off the northwestern side of the island the flood tidal currents set northeastward at a rate of $1\frac{3}{4}$ knots, the ebb sets in direction between southwestward and west-southwestward at about the same rate. Vessels navigating in the vicinity of this island must exercise care to avoid the $1\frac{3}{4}$ -fathom shoal that lies $3\frac{3}{4}$ miles northeastward of its northern extremity.

5-149 **Southeast coast of Trangan.**—The northern part of this coast is low, but the southern part, consisting of low hills that are covered with vegetation, is relatively steep. Northeastward of Tanjong Ngabordamloe, there are some low red cliffs; between this point and a position 4 miles southwestward of Tanjong Goljuring, where there are two large trees near the shore, vessels can approach the coast to within a relatively short distance. Anchorage can be taken during the northwest monsoon off this stretch of coast. Farther northeastward the coast is fronted by extensive drying banks

on which there are numerous reefs and small islets. Sungi Laelaemaar, which is entered close northward of Tanjong Goljuring, is navigable only by small local craft.

Off-lying dangers.—A $1\frac{1}{2}$ -fathom reef lies 3 miles east-southeastward of Tanjong Ngabordamloe.

A $2\frac{1}{2}$ - and a $2\frac{3}{4}$ -fathom shoal are located, respectively, $7\frac{1}{2}$ and 9 miles southward of Tanjong Goljuring.

Off Tanjong Goljuring there are two drying reefs, one located $1\frac{1}{2}$ miles south-southeastward and the other $2\frac{1}{2}$ miles southeastward of the point. On each of these reefs there is a small hut on piles; these structures are good landmarks.

5-150 **Old Krei** ($6^{\circ}45' S.$, $134^{\circ}23' E.$, *H. O. Chart 3027*), the principal village in the southern part of the Aroe Islands, is located on the shore of Trangan about 4 miles northward of Tanjong Goljuring. New Krei is another village, situated $2\frac{1}{2}$ miles farther northward.

Two channels lead to Old Krei. The western channel, in which there is a least depth of 3 fathoms, runs close along the shore of Trangan; it is narrow but has the advantage of being navigable at all stages of the tide. Vessels may pass through this channel by eye provided soundings are constantly taken. Northward of Tanjong Goljuring the western side of the channel should be favored in order to avoid a small drying reef off Biltbur village.

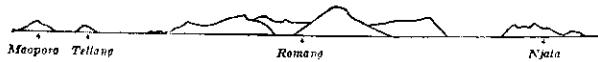
The eastern channel is wider than the other, but it is more difficult to navigate; it is practicable only after half tide, when the reefs are visible.

5-151 **Directions.**—The western side of the small islet that lies southward of Kumnaar and 1 mile northeastward of Old Krei in range with the eastern side of Karwai Islet, bearing 349° , should be an excellent mark; if the first-named island is not visible at a sufficient distance the eastern side of

BANDA SEA AND ADJACENT ISLANDS

Karwai should be steered for on that same bearing. This course is sometimes difficult to make good because of the tidal currents that are frequently strong in this vicinity and, being influenced by the openings in the extensive drying reef around Fenjuring Island, do not always set along the axis of the channel. Care is required to avoid the shoal, on which there is a patch of 8 feet, that extends from the reef west of Wolil Island; since this patch is steep-to on the channel side the lead gives no warning of the approach to it. After passing this shoal steer between Karwai and the drying reef south-southwest of it, and then northward toward the small islet that lies about one-half of a mile eastward of Old Krei; off this village there are depths of 3 to 6 fathoms.

5-152 SERMATA ISLANDS (H. O. Chart 3085).—The Sermata Islands comprise a long chain of islands that extend from off the eastern extremity of Timor to within about 55 miles of the Tanimbar Islands. The islands of the Sermata group are, for the greater part, of volcanic origin; most of them rise steeply from the sea and, therefore, afford few good anchorages. These islands may be considered as belonging to two chains that diverge slightly to the eastward. The principal islands in the northern chain are Wetar (described in H. O. Pub. No. 163, Sailing Directions for Celebes, Southeast Borneo, and Java), Romang, Damar, Toen, Nila, and Seroea. The southern chain consists of Kisar, Leti, Moa, Lakor, Sermata, and Babar.



Romang Islands; highest point of Romang bearing south, distant 24 miles.

5-153 ROMANG ISLANDS.—This group, located about 45 miles north-northeastward

of the eastern extremity of Timor, consists of several hilly islands. The most prominent peaks are those of Romang, Nyata, Tellang, and Maopora. The channels between Romang and the adjacent islands, as well as that between Kital and Maopora, are deep and clear of dangers.

On Maopora and Nyata there is timber of high quality. The inhabitants of the Romang Islands are very backward. Some of the inhabitants have been converted to Christianity, but they are even lazier than the other natives. The climate of the islands is extremely unhealthful; framboesia and elephantiasis are quite prevalent.

5-154 Tidal currents.—The flood currents in general set to the northward and the ebb currents to the southward. The maximum drift in the narrow channels is about $2\frac{1}{2}$ knots; in the wider channels it is about $1\frac{1}{2}$ knots.

5-155 Romang Island (7°35' S., 127°25' E., H. O. Chart 3085 and Neth. Chart 375), the principal island of the group, is about $11\frac{1}{2}$ miles long, northeast and southwest, and $7\frac{1}{2}$ miles wide; it is surrounded by a steep-to reef. The 11-fathom curve passes along the edge of this reef; the only shoal spot is a detached $4\frac{3}{4}$ -fathom reef off the north side of the island. The maximum elevation of the island is 2,451 feet, located $2\frac{1}{2}$ miles southward of its northwestern extremity.

The southern and southwestern coasts of Romang are rocky and are closely backed by a rather high plateau which is separated from the higher northeastern part by a swampy section. Anchorage can be taken off the south side of the island in a depth of 16 to 20 fathoms, sand and stone, opposite a sandy beach near a deserted village that stands west of the southern extremity of the island; the preferred anchorage is in a position from which the southern extremity of the island bears 094° and a small conspicuous house,

standing on the beach between the southern and southwestern extremities of the island, bears 004°.

The west coast of Romang is rocky except in a bight about 4 miles north of the southern end of the island. At the head of this bight is the deserted village of Hila. During the southeast monsoon anchorage can be taken in 16 to 22 fathoms, stone, about 265 yards off the coastal reef abreast the northern entrance point of this bight, with the outermost house at Hila bearing 150°.

The summit of the island, 2,449 feet high, is near the west side, about 2½ miles southward of the north extremity of the island.

The north coast of Romang consists of rocky stretches alternated with small sandy beaches. Anchorage can be taken in Zwaan Bay and in the coves eastward of that bay. In Zwaan Bay there is about 220 yards of swinging room; the anchorage, in which there is good holding ground, is southward of the detached reef that uncovers at half tide, located near the middle of the bay. Vessels should enter the bay only when the reefs are clearly showing.

The east coast of Romang is generally quite steep except in Roemahkoeda Bay, where there is a long sandy beach. During the northwest monsoon anchorage can be taken in 16 to 22 fathoms about 330 yards off the coastal reef in the southern entrance to the channel between Romang and Tellang Islands, with the two points to the northward in range and the conspicuous house on the heights of Romang bearing 281°. The ebb tidal currents at this anchorage set south at a rate of 1½ knots.

5-156 Roemahkoeda (Rumah Kuda) Bay ($7^{\circ}37' S.$, $127^{\circ}25' E.$, *plan on Neth. Chart 375*), a marked indentation in the southeast coast 4 miles northeastward of the southern extremity of Romang, affords excellent anchorage at a distance of 330 yards from the

coastal reef, in 33 to 38 fathoms, with the new mouth of the small river at the head of the bay bearing 315° and Roemahkoeda village bearing 022°.

Caution.—The coastal reef has extended about 220 yards seaward off Hoewai and El Madang, and over 300 yards seaward off Meti Akwaloe.

This anchorage, however, can not accommodate more than one vessel, for there is only about 330 yards of swinging room. The coastal reef is clearly marked by discolored water. Mitan (Nusa Mitan), located southeastward of Roemahkoeda Bay and 2 miles south-southwestward of Tanjung Jen-in Merah, is about 303 feet high and is covered with gray chalk.

5-157 Nyata Island, located $3\frac{1}{2}$ miles westward of the northwestern part of Romang, is surrounded by a very steep-to reef outside of which there are no dangers. There is no anchorage anywhere around this island.

5-158 Tellang ($7^{\circ}32' S.$, $127^{\circ}33' E.$, *Neth. Chart 375*) and Lintoetoe are two small islands lying on the same reef 3 miles eastward of the northeastern extremity of Romang.

5-159 Laoet, a mass of rocks 183 feet high, is located about one-half of a mile northeastward of the northern end of Tellang. Kital, a cone-shaped island 213 feet high and having a sandy shore, lies nearly 1 mile eastward of the southern end of Tellang. It is separated from Tellang and Lintoetoe by a deep and clear channel in which anchorage can be taken in about 12 fathoms, sand, and stones; currents set through this channel with a maximum velocity of $2\frac{1}{2}$ knots.

5-160 Maopora Island, located about 6 miles eastward of Romang, has an elevation of 1,017 feet near its northern end. There is a sandy beach along the west side of the

island, but there is no anchorage off it. A 19-fathom bank projects northward for a distance of 2 miles from the northern end of the island. Anchorage can be taken over a 6-fathom patch on this bank about one-half of a mile eastward of the northern extremity of the islands; there are, however, strong tide rips on this bank. The north coast of the island is rocky and steep. The eastern shore, especially near the south end, is marsh. Juha, situated 1 mile eastward of the southeastern part of Maopera, is a sandbank, covered with vegetation, that remains dry at all stages of the tide; it is surrounded by a very steep-to reef. Anchorage can be taken in the channel between Juha and the coast reef off Maopera. This channel has a width of about 220 yards and a depth of 27 fathoms. The channel is easy to navigate when the reefs are showing clearly. There are two small islets, covered with vegetation, on the reef off the southeast end of Juha. They are easy to distinguish. The maximum strength of the tidal currents through this channel is 2 knots.

5-161 THE DAMAR ISLANDS, located between 75 and 100 miles northeastward of Romang, consist of Damar, Teun, Nila, and some small islets. These islands are high and, rising steeply from the sea, make good landmarks. Damar, Teun, and Nila are inhabited.

5-162 Damar, the largest island of the group, is roughly rectangular, about 9 miles long and $7\frac{1}{2}$ miles wide. On it are several peaks of which the highest, with an elevation of 2,848 feet, is located in the northeastern corner of the island. There is some volcanic activity on the island, but no eruptions have been reported. Earthquakes, accompanied by disturbance of the sea, are, however, frequent. The western side of the island is low in places, but the other coasts are steep-to. The island is very fertile and has several small streams. The village of Kehli, is located on the northern shore of Telok Solat.

5-163 Telok Solat ($7^{\circ}09' S.$, $128^{\circ}41' E.$),

located on the eastern side of Damar Island, is a deep bay that penetrates the island for a distance of $2\frac{1}{4}$ miles; it is surrounded by high and very steep volcanic hills that are wooded to the water's edge. Woeloer village lies on the southwestern side of the bay; on the northern shore, opposite Woeloer, are Solat and Kehli villages. A pier for small craft projects out from the small peninsula on which Solat stands. The head of the bay is filled by a large drying reef that extends eastward as far as Kehli village. That part of the reef between Kehli and Solat discolors well, but the rest of the reef is not so well marked. Near the stream that empties into the head of the bay are a number of hot springs where the natives come to cook their food.

5-164 Anchorage.—During the northwest monsoon the bay affords good anchorage in about 27 fathoms with a house at the mouth of a small stream, located 900 yards northwestward of Woeloer village, bearing 294° , and the pier at Solat bearing 000° . During the southeast monsoon a heavy swell sets into the bay.

5-165 Tides.—In Telok Solat there is both a diurnal and semidiurnal tide, but the latter predominates. The spring low waters of the two tides can coincide. As a result of this coincidence the maximum fall that can be expected is 3.9 feet; this occurs in June and December. The maximum rise, 2.3 feet, occurs at all semi-diurnal spring tides.

5-166 Directions.—Since there are no detached dangers in the bay it is easily entered. The reefs on both sides of the bay are not more than 220 yards wide, but, inasmuch as the prevailing winds push rollers onto the north shore and as the currents set in that direction, care should be exercised to avoid approaching the north shore too closely. In entering the bay, steer for the above-mentioned house near the head of the bay on course 294° .

5-167 Anchorages.—Wilhelmus Bay, lo-

cated on the north side of Damar Island, affords anchorage sheltered against the southeasterly monsoon, but the holding ground is poor and the bottom rises rather steeply. Vessels proceeding to this anchorage enter on a southwesterly course, steering toward the mouth of the small stream that empties into the head of the bay. This anchorage is very unsafe during the northwest monsoon.

Anchorage can be taken off the south coast near Tanjung Paran. Vessels approach the anchorage with the tangent of the southeastern extremity of North Terbang astern, bearing 210° , and anchor on that line in any desired depth clear of the coast reef.

5-168 **Terbang Islands.**—North Terbang, 466 feet high, and South Terbang, 400 feet high, located, respectively, $5\frac{1}{2}$ and $9\frac{1}{2}$ miles southward of Damar Island, are uninhabited. The highest part of South Terbang is a plateau that is steep on the north side and moderately sloping on the south. Temporary anchorage can be taken near the south end of North Terbang in a depth of about 40 fathoms with the 1,529-foot elevation at the southeastern end of Damar lying midway between the southeastern point of Damar and North Terbang. There is sometimes a very strong current in the channel between North and South Terbang.

5-169 **Noes Loer** consist of two small islands, 151 and 98 feet high, respectively, located on an extensive coral reef $8\frac{1}{2}$ miles southwestward of the western extremity of Damar.

5-170 **Teun Island** ($6^{\circ}58' S.$, $129^{\circ}08' E.$, *H. O. Chart 3085*), located $26\frac{1}{2}$ miles east-northeastward of Damar, consists principally of an active volcano, 2,149 feet high, with a crater that is clearly visible from the northward but not from the southward. The last eruption of this volcano occurred in 1904. There are five small villages on this island.

Anchorage may be taken in a depth of 10

fathoms off a small bay on the southwestern side of Teun Island. On the west side of the bay there are high cliffs; the east side is rocky, but lower. Layoni, the largest village on the island, stands on the shore of this bay. The preferred anchorage is with the flagstaff at Layoni bearing 050° and the north point of the bay bearing 332° . The bottom rises very steeply in this vicinity.

5-171 **Nila Island**, located 23 miles northeastward of Teun, is a steep volcanic island, 2,562 feet high, on which there are scattered patches of trees and shrubs. The only eruption on record occurred in 1932, but on the east side of the island there are numerous indications of volcanic activity. The coast in general is steep and high. Nika Islet, 154 feet high, lies on a reef that extends $1\frac{1}{4}$ miles northward from the north side of Nila. Vessels should not approach the north side of Nila within the 100-fathom curve unless seeking anchorage in the channel that penetrates the reef westward of Nika. Among the villages on Nila are Rummadai, located on the east coast, and Wotai, on the south coast.

5-172 **Anchorage.**—Vessels anchor 800 to 1,000 yards westward of the north side of Nila in depths of 16 to 22 fathoms in a channel between the reefs that lie northward of Nila. (*Plan on B. A. Chart 2465.*) This channel has a navigable width of about 200 yards with a least midchannel depth of $4\frac{1}{4}$ fathoms. This summit of Nila bearing 190° leads into this channel, but consideration must be given to the currents which sometimes set diagonally across the entrance. The small islet of Noesafnoe, located close off the middle point on the north coast of Nila slightly westward of the entrance line, is a useful mark but it is difficult to make out from the entrance. About $\frac{1}{2}$ mile southwestward of the anchorage is a small drying reef. In view of the volcanic activity in this vicinity it is advisable to send a boat ahead

to take soundings and mark the reefs along the channel before attempting to proceed in to the anchorage. The anchorage can also be reached from the westward by keeping the south side of Nika bearing 093° , but care must be exercised because this course leads only 75 yards northward of the detached drying reef referred to above.

5-173 **Wotai Road** ($6^{\circ}45' S.$, $129^{\circ}29' E.$, *H. O. Chart 3085*), on the southern side of Nila Island, is open to the southward and is, therefore, exposed to both wind and sea during the southeast monsoon. In the northwestern part of the road is Telok Solat, a narrow bay that penetrates the coast for a distance of about 1 mile; in the middle part of this bay there is an average depth of more than 20 fathoms, but drying reefs fill the northern part and cut off the entrance. The village of Wotai, where there is a flag-staff, stands on the north shore of the roadstead. In the road, outside the shore reef, the depths are irregular. The same care must be taken in this anchorage as in that off the northern end of the island to ensure against the existence of uncharted risings of the bottom as the result of volcanic activity. The recommended anchorage is in depths of 25 to 33 fathoms with Wotai village bearing 342° .

5-174 **Dusburgh Reef**, located $4\frac{1}{2}$ miles northwestward of Nila Island, is a drying, rocky, atoll-shaped formation $2\frac{1}{4}$ miles long northeast and southwest and 1 mile wide.

5-175 **Nil Desperandum (Griffin Reef)**, located 17 miles east-northeastward of Nila Island, is about three-fourths of a mile long east and west and one-half of a mile wide. It is composed of sand and coral and dries 6 feet.

5-176 **Seroea (Serua)**, located about 37 miles northeastward of Nila Island, has a summit consisting of a truncated conical volcanic peak 2,103 feet high, situated near the center of the island. On the northwest-

ern side there is a lesser peak 801 feet high. Eruptions occurred in 1687, 1693, and 1844 on Seroea. The coasts of the island are clear except for a few narrow coastal reefs, none of which has a width in excess of 220 yards. The island has a few hundred inhabitants who live in Lesloeroe village, situated in the northwestern part of the island, and Waroe, on the east coast. On the bank of soundings that extends nearly $1\frac{1}{2}$ miles westward of the western extremity of the island, there is a reef on which are Kekeh Besar, 633 feet high, and Kekeh Ketjil, a much smaller island, located about 200 yards eastward of the eastern extremity of the former. The passage between Seroea and the reef on which these two islands lie is deep and clear of dangers.

Anchorage can be taken in a depth of 33 to 38 fathoms in the channel between Kekeh Ketjil and Seroea. There is also anchorage in depths of 38 to 45 fathoms off a small sandy beach on the north side of the island. On this beach are some conspicuous boat sheds. Vessels approach and anchor with these sheds in range with Lesloeroe village, bearing 186° ; this village lies in a saddle-like depression between the two main peaks of the island.

5-177 **SERMATA ISLANDS—Southern Chain**.—The eastern end of Timor Island (see *H. O. Pub. No. 163, Sailing Directions for Celebes, Southeast Borneo, and Java*) is high and the coast is steep-to. A range of mountains 1,427 to 4,000 feet high, extends in a southwesterly direction from this point, paralleling the coast at a distance of about 2 miles.

5-178 **Jako (Yako)** ($8^{\circ}26' S.$, $127^{\circ}20' E.$, *Neth. Chart 375*), located off the eastern extremity of Timor, is a small, flat, uninhabited island, 266 feet high, that is covered with trees. It appears as a part of Timor except where seen open of that island. Jako

is fringed by a reef that varies in width from a few yards on the west side to about 400 yards on the northern and southern sides of Jako.

Jako Strait is a deep, clear channel, 600 yards wide, which runs between Jako and Timor Islands. The strait can be safely navigated by keeping in

Currents.—The tidal currents set directly through the strait at a rate up to 4 knots. The northerly current is of greater duration than that setting southward. Tide-rips occur at each entrance. Heavy seas prevail off the southern entrance during the southeast monsoon.

5-179 Kisar Island, located about 18 miles north-northwestward of the eastern extremity of Timor, consists of a number of rocky hills, the highest of which is 785 feet high. The coasts, which rise steeply from the sea, consist of gray terraced walls of bare coral lime that are broken in only a few places, where small streams empty into the sea. The inland hills, seen through these breaks in the cliffs, are also gray and very sparsely wooded.

Rain is very uncertain on Kisar; frequently a whole year will pass without a drop of rain. On such occasions the entire population moves temporarily to Romang. The inhabitants live principally in widely scattered huts in the valleys, but there are a few villages in the hills. The climate is healthful.

5-180 Pantai Wonreli Road

██████████ is an open roadstead on the west side of Kisar. A narrow drying reef, behind which there is deep water, lies about 100 yards offshore and thus acts as a breakwater. A shallow channel, used by flat-bottomed boats at low water and by loading proas when the water is above the half-tide level, gives access to the water area behind this reef. The shore of the bight is a sandy beach on which there are a few sheds. A

white pyramid stands on the south shore of the bight.

5-181 Anchorage can be taken in depths of 16 to 22 fathoms, coral and stones, about 160 yards west-northwestward of the white pyramid on the south shore of the bight. Farther offshore the bottom is so steep that there would be danger of dragging the anchor. It is customary to run a hawser to the shore, but with an offshore wind or at the change of the monsoon and during the southeasterly monsoon, when the tidal currents set along the shore in a north-northeastly and south-southwesterly direction, it is very improbable that even a very strong hawser would hold a vessel in position. During an onshore wind, of course, this anchorage can not be used.

Furthermore, during some months of the year cyclonic winds and "valwinden" (sec. 5-63) make the anchorage untenable. The northwest monsoon not only makes anchorage impossible but also prevents boats from approaching the shore; during that season contact with the island is made on the east side, at Pantai Poera Poera, where vessels heave to and send boats ashore.

5-182 Tides.—At Pantai Wonreli Road there is both a diurnal and a semidiurnal tide, but the latter predominates. The spring high waters of the two tides can coincide. As a result of this coincidence the maximum rise, occurring in March and September, is 3.1 feet above mean sea level. The lowest water level, 2.8 feet below mean sea level, occurs between January and March and between July and September at semidiurnal spring tides.

5-183 Pantai Wonreli, situated some distance inland, is the only village of any importance on Kisar. Near Pantai Wonrei is Kota Lama, a small village that consists of the descendants of Europeans who

settled there during the occupation of the island by the East India Company; they are mostly white and still have European names. Cattle, sheep, goats, and fowls are obtainable at Pantai Wonreli, but no vegetables can be had. Vessels call regularly at this village, except during the northwest monsoon, when the port of call is Pantai Poera Poera, on the east side of Kisar. There is a radio station at Pantai Wonreli.

5-184 THE LETI ISLANDS, lying east-northeastward of the eastern extremity of Timor, include Leti, Moa, and Lakor Islands. Leti and Moa are fairly hilly, but Lakor is rather low; however, since the trees on the latter island attain a height of more than 160 feet, Lakor can be seen for more than 15 miles.

Destructive cyclonic storms sometimes occur in these islands, particularly in the spring, at the time of the change of the monsoons.

5-185 Leti Island ($8^{\circ}12'S.$, $127^{\circ}42'E.$), the westernmost island of the Leti group, lies about 22 miles east-northeastward of the eastern end of Timor. Along the middle of the island is a chain of rounded hills, the highest of which attains an elevation of 1,332 feet. The hills in the central part of this chain are not wooded but are sparsely covered with tall grass; the low hills at the eastern end of this chain are covered with trees. On the low parts of the island there are many coconut trees. At the base of the hills and extending thence to the shores of the island is flat land that forms a sort of terrace 25 to 60 feet high. A reef skirts the eastern end of the island.

The inhabitants of the island live on the low land, usually near the shore. Most of the villages are built on coral reefs 30 to 40 feet high. Some of the natives are from Kisar and have European features and Dutch surnames. In times of drought or famine the people temporarily move to Moa Island. It is only during certain months of the year that the small streams on the island furnish any water, but, by digging huge pits in the

beds of these streams near the shore, fresh water can be obtained even during the dry season. Native buffalo, hogs, and goats, both wild and domesticated, are found over the entire island.

5-186 Serwaru anchorage.—During the southeast monsoon vessels can anchor off the village of Serwaru [REDACTED], which lies on a bare strip of land that is fronted by a sandy beach on the north side of Leti. For several hundred yards eastward of the village the coast is low, but beyond that distance it becomes steep and cliffy and trends northeastward for a short distance, thus forming a small bight which is protected on its west side by a short mole built of coral stones. In this bight, about 470 yards eastward of the mole, is a landing place which is reached by means of a shallow channel that is marked by an unofficial beacon consisting of two crosses on a spar. Owing to the existence of a detached drying reef offshore, loading or unloading can be carried on only at high water, and even then it is very difficult when there is any sea. Anchorage is taken in a depth of 14 to 16 fathoms, coral and stones, poor holding ground, with the northern extremity of Leti, near Tutukai village, bearing 101° and Woearlawan, the highest hill on the island, bearing about 180° . This anchorage is somewhat dangerous during the northwest monsoon.

5-187 Loehoelele anchorage.—On the south side of the island, fronting the village of Loehoelele, which is located about $2\frac{3}{4}$ miles from the east end of the island, is an anchorage in depths of 20 to 40 fathoms. Vessels can anchor anywhere between the crescent-shaped drying reef that lies southward of the eastern end of the village and a sandy bank that projects out 1 mile in a southwesterly direction from the shore $1\frac{1}{2}$ miles westward of the village.

5-188 Moa Strait, a deep and clear chan-

nel between Leti and Moa Islands, is about 2 miles wide. Tidal currents are strong in the channel and sometimes cause a very choppy sea when setting against the wind.

5-189 Moa Island ($8^{\circ}12'S.$, $128^{\circ}00'E.$), located eastward of Leti Island, consists of a coral lime plateau, 30 to 65 feet high, from which rise two groups of hills. The western group, located in the northwestern part of the island, has a maximum elevation of 948 feet in a position $5\frac{1}{2}$ miles eastward of the western end of the island; the eastern group, with a maximum elevation of 1,230 feet, lies 2 to 4 miles eastward of the center of the island. A few of the hills are wooded, but most of them are bare. The main part of the island is fertile but marshy in spots. The small streams furnish good drinking water. The inhabitants live in nine villages, of which Pati, located on the south coast, is the most important; it is the place of residence of the native ruler of the island.

5-190 **Anchorage**.—Since the coasts of Moa are steep-to, the island has no safe anchorages, but during the change of the monsoons and at the beginning of the southeast monsoon anchorage can be taken almost anywhere off the south coast of the island; it is customary to anchor in depths of 20 to 25 fathoms, sand, at a distance of about 200 yards from the coast reef. The current sets along the coast and at times attains a velocity of 2 to 3 knots.

In the vicinity of Kaiwatu, located on the western part of the north coast of Moa, anchorage can be taken in a depth of 19 fathoms, with Mt. Karbau, the highest hill on the island, bearing 111° and the flagstaff bearing 223° . Inasmuch as the tidal currents in this vicinity are quite variable in direction, care must be exercised to ensure that the anchor has taken hold.

Small vessels may anchor in deep water

off Pati village on the south coast of Moa during calm weather.

In the absence of strong winds and currents, temporary anchorage may be taken off Klis village, which lies at the bend of the south coast $5\frac{1}{2}$ miles eastward of Pati village. The anchorage is about 300 yards from the drying shore reef in a depth of 34 fathoms, sand, with the village flagstaff bearing 047° and Tanjong Toet Nei, the point of land $1\frac{3}{4}$ miles south-southeastward of Klis village, bearing 151° .

5-191 **Lakor Strait**, between Moa and Lakor Islands, is nearly 2 miles wide and clear of dangers. Eddies and strong tide rips are frequently encountered off Moanga, a village on the east coast of Moa, and off the northwestern extremity of Lakor. The tidal currents set through this strait with a velocity of 4 knots or more.

5-192 **Lakor Island** ($8^{\circ}15'S.$, $128^{\circ}10'E.$), located eastward of Moa, is low and flat, but its tall trees make it a good landmark. The generally rocky shores are broken in places by short stretches of sandy beach. There are ten villages on the island. Warwawang village, situated on a rocky cliff on the north side of the island, is conspicuous. The principal product of the island is tobacco, which is sold to the people on nearby islands. There are no rivers on the island but water is obtained from pits.

5-193 **THE BABAR ISLANDS** consist principally of Meati Miarang, Sermata, and Babar Islands, together with the smaller islands adjacent to them. With the exception of Meati Miarang the islands of this group are hilly and, therefore, afford good landmarks; furthermore, these islands can be approached to within a short distance.

5-194 **Meati (Meati) Miarang** (), a small, flat, densely wooded island, is located 16 miles east-southeastward of the southeastern end of Lakor, near the

southeastern extremity of a drying reef that has a length of $12\frac{1}{2}$ miles, north-northwest and south-southeast, and a maximum width of about 5 miles. On the reef about one-half of a mile westward of Meatij Miarang is Morau, a low, wooded islet, and close off the southeastern end of the island are Djagat Toetoe, two small rocky islets. On the northwestern end of the reef are Amortoean and Meaterialam, two low but wooded islets; the latter islet has a rather conspicuous tree on its west side. The sides of the reef are so steep-to that it is impossible to anchor outside it. The reef encloses a lagoon which can be reached from the east side through a channel that has a width of about 160 yards and a least depth of 18 feet in the fairway.

The entrance is marked on the starboard side, entering, by a white conical buoy and on the port side by a black can buoy. A course of 222° leads in to the lagoon. Inside the lagoon, there are numerous reefs two of which are marked, respectively, by a black and white iron beacon. There is anchorage in the southern part of the lagoon northward of Meatij Miarang, but navigation is so difficult that local knowledge is essential. Strong tidal currents should be expected in the entrance channel. Meatij Miarang is the only inhabited island on the reef.

A light is shown from the western side of Meatij Miarang.

Meteorological table for Meatij Miarang.
(See appendix II.)

5-195 Luang and Kalapa Islands ($8^{\circ}10' S.$, $128^{\circ}44' E.$, *H. O. Chart 3085*), located, respectively, 14 and 18 miles northeastward of Meatij Miarang, lie on a drying reef nearly 15 miles long; on this reef there are several smaller islets. Luang, an almost barren island lying near the center of the reef, has two conspicuous hills; the highest of these has an elevation of 853 feet. Kalapa,

the easternmost and largest island on the reef, is generally low, but is covered with tall trees. Metoetoe, located on the reef $1\frac{3}{4}$ miles eastward of its western end, is covered with rather high coconut trees. Small craft sometimes anchor at the western end of the reef. Luang is the only inhabited island of the group. The natives are skilled in making gold and silver ornaments. The principal products of the island are turtle and trepang. There are only two wells on the island, and the water from them is brackish.

5-196 Sermata Island, located close eastward of Kalapa, is a long, narrow island down the middle of which runs a chain of small, round, grass-covered hills. The maximum elevation of the island is 1,286 feet. Near the eastern end of the island is a conspicuous hill, 1,223 feet high, that is covered with trees. There are 12 villages on the island. Agriculture is the principal activity.

Anchorage may be taken in Lelang Bay, on the south side of the island at the time of change of the monsoons and during the northwest monsoon, but the bottom rises steeply and, during the northwest monsoon, the anchorage is frequently made unsafe by sudden violent squalls. The bottom rises so steeply that there is no other anchorage in the vicinity of Sermata.

5-197 Babar Island ($7^{\circ}55' S.$, $129^{\circ}45' E.$, *H. O. Chart 3085*), located about 40 miles east-northeastward of Sermata, is about $16\frac{1}{2}$ miles long and 15 miles wide. It is fertile and covered with forests. On the island are a number of hills, the highest of which, located near its center, has an elevation of 2,710 feet; this hill, however, is not particularly conspicuous. In the northeastern part of the island is a group of hills whose sloping sides constitute a good landmark for vessels northwest or southeast of the island. The coasts, sloping down from the hills, are fringed in places by a drying reef 200 to 300 yards wide. The water from

the rivers of this island, as well as from those of Wetan, discolor the sea for a great distance.

5-198 **Tepa Road** (*plan on B. A. Chart 2465*), located on the west coast of Babar Island, affords the best anchorage in the vicinity during the southeast monsoon. The best anchorage is in a depth of 8 fathoms off the village, with the flagstaff there bearing 090°. This position is about 200 yards outside the 5-fathom curve and 150 yards south-southwestward of a 1-fathom reef. During the northwest monsoon it is preferable to anchor in Herlei Road. In this monsoon there are frequently heavy seas in the road and breakers on the beach, but it takes very strong winds to cause vessels to drag. There is room for several vessels in the road.

5-199 **Signal**.—A blue flag hoisted at the flagstaff signifies that cargo cannot be worked at Tepa. Vessels then ordinarily proceed to Herlei on the opposite side of Babar Strait to wait until the conditions at Tepa are more favorable.

5-200 **Tides**.—At Tepa Road there is both a diurnal and a semidiurnal tide, but the latter predominates. The spring lows of the two tides can coincide. At a result of this coincidence the lowest water level, occurring in May or June and November or December, is 3.28 feet below the mean level. The maximum rise is about 2.6 feet above the mean level.

5-201 **Directions**.—Vessels approaching the anchorage proceed in as slowly as possible, steering for the flagstaff at Tepa on course 090° and carrying the anchor down with about 15 fathoms of chain; when the anchor takes hold chain is paid out as desired. During the northwest monsoon it is best to come in with about 25 fathoms of chain out.

5-202 **Tepa Village** is situated at the southern part of the bight abreast the roadstead.

5-203 **Southwest coast of Babar—Anchorage**.—The southwest coast of Babar is fringed by a narrow, rocky, steep-to reef. A detached reef with a diameter of 340 yards and a least depth of 2 3/4 fathoms lies 1 1/2 miles off this coast in a position 5 1/4 miles west-northwestward of the southern extremity of the island; this reef seldom discolors. Anchorage can be taken in a depth of 27 fathoms almost anywhere on the coast reef along this side of the island; the recommended method of anchoring is to approach the coast slowly while carrying the anchor with about 40 fathoms of chain out.

5-204 **South and east coasts of Babar—Anchorage**.—Several detached reefs over which there are depths of 2 3/4 to 4 1/4 fathoms lie close off the coast between Ahanari and Wakpapapi villages, 4 3/4 to 6 miles northeastward of the southern end of the island; these reefs do not discolor. Another reef, with a least depth of 3 3/4 fathoms, a length of 1 1/2 miles, and a breadth of 100 yards lies about 700 yards offshore abreast the village of Letwurong; this reef discolors and the passage between it and the coast is clear. Anchorage can be taken close to the shore anywhere along these coasts except in the bight in the northern part of the east coast.

5-205 **North coast of Babar—Anchorage** can be taken northward of Jatoke village near the northeastern extremity of the island. For a distance of 4 miles westward of this position the coastal reef is so narrow and steep-to that it affords no anchorage, but beyond that distance, as far as Manuwui village, the northernmost point of the island, anchorage can be taken anywhere. Vessels should approach slowly, carrying the anchor on 30 fathoms of chain.

5-206 **Wetan Island** (7° 55' S., 129° 30' E., H. O. Chart 3085), lying close off the western

end of Babar, is about $6\frac{3}{4}$ miles long, north and south, and 1 to 3 miles wide. It consists of a low chalk plateau, about 30 feet high, from which rise two groups of hills the one at the northern end of the island attains a height of 450 feet, that near the south end, 1,143 feet. The coasts of the island are low and wooded. There are several villages on the island.

5-207 **Herlei (Herile) Road**, on the east side of Wetan Island, affords comparatively safe anchorage in a depth of 27 fathoms. Vessels bound for Tepa during the northwest monsoon frequently anchor here to await an opportunity to work their cargo at Tepa. Swells that come in through the open Babar Strait are frequently troublesome in this road.

5-208 **Babar Strait** (*plan on B. A. Chart 2465*), separating Babar and Wetan Islands, is deep and about 1 mile wide in its narrowest part. A $3\frac{3}{4}$ -fathom shoal lies on the west side of the southern part of the strait about one-half of a mile off the shore of Wetan, $2\frac{1}{2}$ miles northeastward of the southern end of that island.

Currents, which are sometimes accompanied by a heavy swell, set northward and southward through Babar Strait.

5-209 **Dai Island** (*H. O. Chart 3085*), situated $12\frac{3}{4}$ miles northward of Babar, is about 4 miles long and $\frac{3}{4}$ to $1\frac{1}{2}$ miles wide. It has three summits of which the easternmost and highest has an elevation of 2,134 feet. Anchorage may be taken in the bight on the north coast of the island opposite Lewa village; the anchorage should be approached slowly with the anchor and about 38 fathoms of chain out. The coast reef, however, is narrow and vessels are exposed to dangerous squalls, particularly during the southeast monsoon. Boats can land near the village during calm weather.

5-210 **Daweloor (Dawelur) and Dawera Islands**, located about $10\frac{1}{2}$ miles northeast-

ward of Babar, extend over a distance of $7\frac{1}{2}$ miles in a northwest-southeast direction. The maximum elevations of the two islands are, respectively, 959 and 1,094 feet. Both islands are inhabited. They are separated by a narrow, reef-bordered strait in which there is a least midchannel depth of 10 feet. Three detached patches with depths of $2\frac{3}{4}$ to $5\frac{1}{2}$ fathoms over them lie about $\frac{1}{2}$ mile southward of the southern end of Dawera Island. A coastal reef, near the outer end of which there is a depth of 10 feet, also projects more than 1 mile westward from the southwestern extremity of Dawera. Coast reefs extend into the channel from the southeastern extremity of Dawera and Daweloor.

5-211 **Anchorage** can be taken in a bight on the west side of Dawera, opposite Ilmarang village, in depths of 27 to 33 fathoms. This anchorage affords protection during the southeast monsoon. Vessels should approach on a southeasterly course along the shore of the island. The reef tongue projecting out from the southwestern extremity of the island can be readily made out.

Anchorage can also be taken in depths of 15 to 20 fathoms in Watoewai (Watteweh) Road (*B. A. Chart 2465*) in an opening in the shore reef at the western end of Daweloor Island.

5-212 **Masela Island** ($8^{\circ}09' S.$, $129^{\circ}52' E.$, *H. O. Chart 3085*), $6\frac{1}{2}$ miles southeastward of Babar Island, is $9\frac{1}{2}$ miles long and 1 to $1\frac{3}{4}$ miles wide. It has three summits the highest of which, located near the center of the island, is 651 feet high. It is surrounded by a reef which dries in most places and extends eastward about $1\frac{3}{4}$ miles from the southern end of the island. A detached 7-fathom patch lies $1\frac{1}{4}$ miles offshore about midway of the east side of the island. There are a number of detached reefs and shoals closer inshore on both the east and west sides of the island; the reefs on the east

side are not so well marked by discoloration as are those on the west side, especially those which have depths of less than 5 fathoms.

Anchorage can be taken anywhere around the island in depths of 30 to 40 fathoms. Vessels sometimes anchor in the opening in the reef on the southeastern side, off Telalora village, when the reefs are marked by discolored water; during the southeast monsoon, however, there is so much sea at the entrance to the opening that a vessel can not enter.

5-213 THE TANIMBAR ISLANDS

lying eastward of the Sermata Islands and southwestward of the Aroe Islands, consist of Jamdena, and about 66 smaller islands fringed by steep coral bluffs. Except for Moloe, Maroe, and Fordate Islands, located northward of Jamdena, and the larger islands off the west side of Jamdena, the Tanimbar Islands are low but not flat. The southern part of Jamdena, northward and westward of Saumlaki Bay, is hilly, but none of these hills is conspicuous. Along the east coast of this island there are also a number of hills which, however, are useful as landmarks only to those who are familiar with the locality. But the points of Jamdena, as well as the numerous islands around it, are useful in fixing the position of vessels in this vicinity.

Inasmuch as discolored patches are frequently encountered in relatively deep water in the vicinity of the Tanimbar Islands, and as the reefs on the western side of Jamdena and Selaroe and in Egeron Strait seldom disolor, it is imperative to keep a constant check on the position of the vessel and to proceed close to the islands only when the reefs can readily be sighted. Cyclonic storms occasionally occur in the Tanimbar Islands.

All of the larger islands are inhabited, but the density of population, which is not great, varies considerably among the sev-

eral islands; furthermore, it is affected by the migrations of the inhabitants. With the exception of some Mohammedan villages on Moloe and the small island of Karata, the entire population is Christian. The natives along the southern half of the east coast of Jamdena and on part of Fordate Island are Catholics, the others are Protestants. In all of the villages there are schools with native teachers. The natives are reported to be reliable and worthy of confidence; good pilots can be obtained in many of the villages. Coconut plantations are being started in many places on these islands. There are believed to be untouched oil fields in the interior of Jamdena.

5-214 Jamdena (Yamdena, or Timor Laut), the principal island of the Tanimbar group, is 64 miles long, north-northeast and south-southwest, and 24 miles wide in its middle part. It is a relatively flat island of coral formation. The low western coast is fronted by islets and reefs. The eastern coast, which is indented by several small bays and is fringed by reefs, is closely backed by a number of hills of which the highest, located about midway of the coast, has an elevation of 787 feet.



Islands northward of Jamdena; Keljobar Wahan bearing 264°, distant 13 miles.

5-215 Islands northward of Jamdena.— Moloe (Molu) (6°45' S., 131°32' E. [redacted])

and Maroe (Maru), located about 4 miles southward of Moloe, lie at the northern end of the Tanimbar Islands. Near the northwestern extremity of Moloe is a hill 899 feet high, and in the southeastern part of the island is another hill 646 feet high, named Keljobar Wahan. Loebwaan, the highest point of Maroe, located near the

center of the island, is a conspicuous hill 879 feet high. The islet of Kalbur, located three-fourths of a mile northward of Moloe, is uninhabited; the channel separating these two islands is clear of dangers, but there is sometimes a heavy sea in it. Wayangan Islet is located at the south-southwestern end of the shore reef that projects out 2 miles from the southern end of Moloe.

There are villages around Telok Loka and on the west coast of Moloe. Coconut plantations have been established in places on both Moloe and Maroe. The shore reef that projects westward from the southwestern end of Maroe is visited by many trepang fishermen from Moloe when the weather is favorable.

5-216 Anchorage can be taken during the northwest monsoon in Telok Loka, a bight on the east coast of Moloe. The reef that juts out from the northern entrance point of the bight is so well marked by discolored water that vessels can pass closely along it. Vessels can also anchor in 22 fathoms off Adodo village on the west coast of Moloe, and in depths of 22 to 27 fathoms off the east coast of Maroe, except near the coconut plantation at the southeastern point of the island.

5-217 The channel between Wayangan and Maroe affords the best route for vessels coming from the northwestward and bound for Ritabel, particularly during the southeast monsoon; the islands of Fordate and Larat provide some protection against these winds, which here blow very strongly. Choppy seas frequently are encountered in this vicinity when the wind is blowing in a direction opposite to that of the tidal currents.

5-218 Nus Lima consists of a group of islets on a reef $2\frac{1}{2}$ miles long and 2 miles wide, located 6 miles southeastward of the southern end of Maroe. The reef discolors

well, but the shoals do not. On Wermatan, the largest of these islets, there are some huts that are used at times by the natives who work the coconut plantations; the other islets are uninhabited. A very small islet, named Kjabrengan, is located about 1 mile northwestward of the main body of the reef; between them is an unusable channel in which there is a least charted depth of $4\frac{1}{4}$ fathoms. Close southward of Kjabrengan is a $1\frac{1}{2}$ -fathom shoal.

5-219 Frinoen (Vrinun) and a very conspicuous rock lie on a reef $1\frac{1}{2}$ miles long and 1 mile wide, situated $3\frac{1}{2}$ miles southward of Wermatan. Frinoen is low, very sparsely wooded, and uninhabited. The reef is well marked by discoloration. An isolated $3\frac{1}{4}$ -fathom patch that does not discolor lies 2 miles southeastward of Frinoen.

5-220 Farnoesan (Barnusa) is an elongated islet surrounded by a wide reef which discolors, located $1\frac{1}{2}$ miles off the north coast of Jamdena and $5\frac{1}{2}$ miles southeastward of Frinoen. On the islet there are a few temporary huts that are used at times by workers on the coconut plantation.

Metti-Rottan, located close off the north coast of Jamdena and $1\frac{1}{2}$ miles southeastward of Farnoesan, is a roughly circular reef about $1\frac{1}{2}$ miles in diameter. It is usually well marked by discolored water.

5-221 Larat Island ($7^{\circ}09' S.$, $131^{\circ}51' E.$), the western end of which is separated from the northeastern extremity of Jamdena by a very narrow channel, is low and wooded. Ritabel Bay lies at the western end of the island. The island is skirted in most places by a reef. On the reef off the northern side, $2\frac{1}{2}$ miles northeastward of the western end of the island, is Vat sori, a rock which from the westward has the appearance of a proa without masts; it is a good landmark. Off the southwestern side of the island is Sari Karmut, a large reef; smaller reefs and shoals extend for a

distance of $1\frac{1}{2}$ miles northwestward and $2\frac{1}{2}$ miles westward of Sari Karmut. The channel between this detached reef and the shore reef of Larat is clear and can be navigated on sight of the reefs. The narrow channel between Larat and Jamdena can be used only by small craft.

5-222 **Ritabel Bay** [REDACTED].—Close off the western end of Larat Island is the low, flat Lutur Island, which is connected with Jamdena by a reef; this reef extends around the western end and along the north side of the island with a width of about 800 yards. Watmomal, a rock located on the shore reef close off the northeastern extremity of Lutur, is very conspicuous. Between Lutur and Larat Islands is Ritabel Bay, a well-sheltered rectangular area nearly $1\frac{1}{2}$ miles long and 550 to 900 yards wide. The houses of Ritabel village, located on the western extremity of Larat Island, can be seen for a distance of 8 miles on a clear day. The village of Watidal stands on a hill on the west side of the entrance to the bay $1\frac{1}{4}$ miles northeastward of Ritabel. On the east end of Lutur Island, opposite Ritabel, is the village of Lelingloeau (Liling Luan).

Light.—A light is shown from a 16-foot wooden post at the head of the pier at Ritabel when vessels are expected or when they are departing.

Beacons.—A white iron beacon marks the northeastern extremity of a reef extending northward from Lutur Island, on the west side of the channel leading into Ritabel Bay.

A black iron beacon with a truncated conical top mark stands on the northwestern extremity of the reef on the east side of the channel to Ritabel, 875 yards northward of the northwestern extremity of Larat Island; a similar beacon stands on a projecting point of the shore reef 300 yards north-northwestward of Ritabel village.

5-223 Anchorage can be taken in depths of $6\frac{1}{2}$ to 11 fathoms, mud, in Ritabel Bay about midway between Ritabel village and the opposite shores of Lutur Island. Strong northerly winds send a heavy swell into this anchorage.

5-224 **Tides.**—At Ritabel there is both a diurnal and a semidiurnal tide, but the latter predominates. The spring highs and spring lows of the two tides do not coincide. The highest water level occurs in March or April and October or November, the lowest in February and August. The maximum rise and fall that can be expected are, respectively about 3.0 feet above and 3.6 feet below mean sea level.

5-225 Ritabel village is located on the western end of Larat Island on the east side of Ritabel Bay. A pier projects out to the edge of the reef from the shore abreast the village. Vessels call regularly at Ritabel, where there is also a radio station.

5-226 **Orarfroeian Strait** ($7^{\circ}05' S.$, $131^{\circ}55' E.$ [REDACTED]), between Larat and Fordate Islands, is clear of dangers and the shore reefs on either side are well marked by discoloration.

Fordate (Vordate) Island is very hilly and has a number of conspicuous peaks. There are villages on the west coast and south sides of the island. At Aweer village, on the west coast near the southern end of the island, there is a small but conspicuous church. There is a rocky stretch on the west coast between Sofianin and Adodo villages. Anchorage can be taken in depths of about 27 fathoms on both the east and west sides, except off the rocky area mentioned above.

Shoal.—A shoal, with two spots having depths of $4\frac{1}{2}$ fathoms and covering a radius of $1\frac{1}{2}$ miles, is located with its center about